HANDBOOK OF FIRST AID AND ELEMENTS OF HOME NURSING AND HYGIENE

158

194

SHA

PH270

HANDBOOK OF FIRST AID

AND

ELEMENTS OF HOME NURSING AND HYGIENE

610·7
SHA

3270

BY

COL. M. SHANKHLA
Officer on Special Duty (Civil Defence)
Directorate General of Health Services,
New Delhi.

16.3,10.5,146

Central Health Education Bureau
Directorate General of Health Services
Ministry of Health, Government of India
New Delhi

610·7 SHA

CONTENTS

		Page
	Foreword	i
	Introduction	iii

Part I

Chapter		
I	General Principles of First Aid and the Handling of casualties	1
II	How the body is made and how it works	5
III	Dressings and bandages	11
IV	Haemorrhage	21
V	Crushing injury—injuries from blast, wounds of the chest and abdomen ..	29
VI	Fractures	36
VII	Shock and collapse	44
VIII	Burns Scalds	47
IX	Unconsciousness	49
X	Artificial respiration	54
XI	Effects of climate	66
XII	Other emergencies	68

PART II

XIII Disposal and transport of casualties .. 73

XIV Blanketing a stretcher; blanketing a badly injured casualty; blanket lifts .. 105

XV Labelling of casualties and disposal of the dead 114

PART III

XVI Elements of home nursing 116

PART IV

XVII Elements of hygiene 130

APPENDIX

List of Illustrations

1. Design for Deep trench latrine.
2. Design for bore hole latrine.
3. Otways pit—Anti-fly method of disposal of excreta

PH270

FOREWORD

Aggression on our frontiers has focussed attention on the problems of Civil Defence and the need to train and maintain in training a large number of volunteers, in different parts of the country, to give first aid to the wounded. In an air raid, the hospitals are kept very busy attending to the seriously injured, and the first aid and nursing for minor casualties and ordinary sickness has to be arranged in their homes. It was decided, therefore, to train a large number of volunteers in home nursing and first aid, which will prove useful to the citizens even in peace time. Under war conditions the normal sanitary services are also likely to be disrupted. Volunteers trained to give advice on safe water supply and alternate means of

disposal of waste products can prove very useful in such an eventuality. The knowledge will help them in such rural areas where these public health services have not been developed.

We wanted a book for this purpose which would use simple terms and keep to essential procedures of first aid and serve as a basis for training of volunteers in the gentle handling of casualties. A chapter each on elementary Home Nursing and Hygiene was added to make the book comprehensive.

It is hoped that this book will prove useful as a text book for the trainees and also as a pocket guide for easy reference.

(SUSHILA NAYAR)

Union Minister for Health

INTRODUCTION

This handbook on First Aid has been compiled to meet the needs of Civil Defence in the country. The picture presented here is one of large number of casualties occurring over a short period of time. It is further visualised that a Casualty Service Organization duly backed up by Emergent Hospital Services would be functioning at the time and the first aid that would be given would form an advance element of this Organization. Stress, therefore, has been placed on speed, priorities and attending to the essentials, leaving the elaborate procedures to the medical agencies through which the casualty will pass in course of further medical care.

To keep up the interest of the First Aid Volunteer and help him to improvise where

possible, an attempt has been made to build up his theoretical background as much as possible.

In an emergency, the first aid volunteer will have to assume additional responsibilities with regard to follow up of light casualties in their homes and also checking on water and sanitary duties. Some 'elements' of Home Nursing and Hygiene have, therefore, also been included and the book made more comprehensive.

In compiling the handbook I have been conscious of my debt to the authors and publishers of the First Aid text books available at present. I have freely drawn on material contained in some of these books. I am specially indebted to Her Majesty's Stationery Office, U.K. and the British Information Service in India for kindly allowing me to use the material from the following publications :

1. Civil Defence Handbook No. 6—First Aid(C.D.) and

2. Elements of First Aid Pocket Book No. 1 (C.D.).

Grateful acknowledgement is also made to ne following publications from which material has been utilised :

1. A.M.C. Training Pamphlet No. 1 and
2. Mouth to mouth Breathing (Expired Air Resuscitation), D.G.A.F.M.S. Medical Memorandum No. 29.

M. Shankhla, Colonel
Officer on Special Duty (Civil Defence)

PART I

CHAPTER I

GENERAL PRINCIPLES OF FIRST AID AND THE HANDLING OF CASUALTIES

1. The objects of first aid are :

(i) to save life—that is to know how to
- (a) stop bleeding (haemorrhage),
- (b) carry out artificial respiration,
- (c) treat shock ;

(ii) to prevent an injury becoming worse by
- (a) protection of the wound,
- (b) immobilisation of a broken bone ;

(iii) to ease pain by :
- (a) least possible movement,
- (b) gentle handling,
- (c) supporting the casualty in a good position.

2. The hall-marks of a good first aid worker are :

(i) *Commonsense*—he must know his limitations and avoid doing too much for his patient ;

(ii) *Initiative,* and ability to improvise ;

(iii) power of leadership and ability to organise unskilled onlookers and survivors as helpers, messengers, stretcher bearers and the like.

3. At the scene of any accident or disaster involving many injured people the first thing to do is to carry out a reconnaissance in order to assess :

(i) the number of casualties,

(ii) the nature of their injuries,

(iii) the priorities of their treatment,

(iv) the presence of hazards such as fire, flooding, live electric wires and escape of coal gas.

General principles of first aid

4. The general principles of first aid may be summarised as follows :

(i) The casualty must be removed at once from any source of danger, or the source of danger from the casualty.

(ii) First aid should be confined to essentials only.

(iii) Severe bleeding must be attended to at the earliest possible moment.

(iv) If a casualty is found to have difficulty in breathing or to have stopped breathing, the cause of this must be dealt

with and artificial respiration, if needed, commenced at once and continued so long as there appears to be any chance of restarting normal breathing. Death is not to be assumed because signs of life are absent. In a case of true suffocation it is better to persist with artificial respiration on a corpse, than to let a man die for lack of doing this. Instances have occurred in which persons have recovered after breathing has stopped for many hours. In case of doubt a doctor must always be called to decide whether life is extinct or not.

(v) Shock must be treated. It varies in degree from faintness to extreme and dangerous collapse, but it is always present to some extent in every casualty, however slightly injured, and may even affect those who are uninjured.

(vi) When a bone or bones are found to be broken, or it is suspected that they are, great care should be taken to immobilise the affected part so that the patient can be moved as quickly as possible, without the danger of the break in the bone becoming worse.

Shock will be increased by unnecessary handling of the parts. Special care should be taken when the broken ends of a bone or bones protrude through a wound in the skin.

(vii) Pain must be relieved by supporting the injured part in the most comfortable position.

(viii) It must be remembered that a casualty is a human being who has probably had a terrifying experience and suffered a severe shock. If conscious, he will naturally be anxious not only about his own condition, but also about the fate of relatives and friends who may have been near him at the time. It is the duty of a person who renders first aid to do all in his power to gain the confidence of a casualty, by firm but gentle handling, and to relieve his anxiety by convincing reassurance. On no account should the condition of a conscious casualty be discussed with other helpers in his presence, or instructions given in whispers ; this would make the casualty think that something is being said which is not meant for him to hear, and so anxiety would be increased.

CHAPTER II

HOW THE BODY IS MADE AND HOW IT WORKS

1. *The Human Body* is built on a framework of bones. This framework is the skeleton (fig. 1).

2. The bones are joined together by joints. Joints are made like door hinges, and they act like door hinges. They allow the bones to move to and fro.

3. The main prop of the skeleton is the backbone. This bone is made up of short sections and looks something like a bamboo cane.

4. Fixed to the top of the backbone is the skull. This is a box made of bone. Inside the backbone is the spinal cord. Inside the skull is the brain. The spinal cord connects with the brain through a hole in the base of the skull. There is a hole in the skull for the nose. There are two holes at either side for the ears. There are two sockets for the eyes.

5. The jaw-bone is hinged at either side and swings underneath. The teeth are fixed into the jaw-bone below and the skull above.

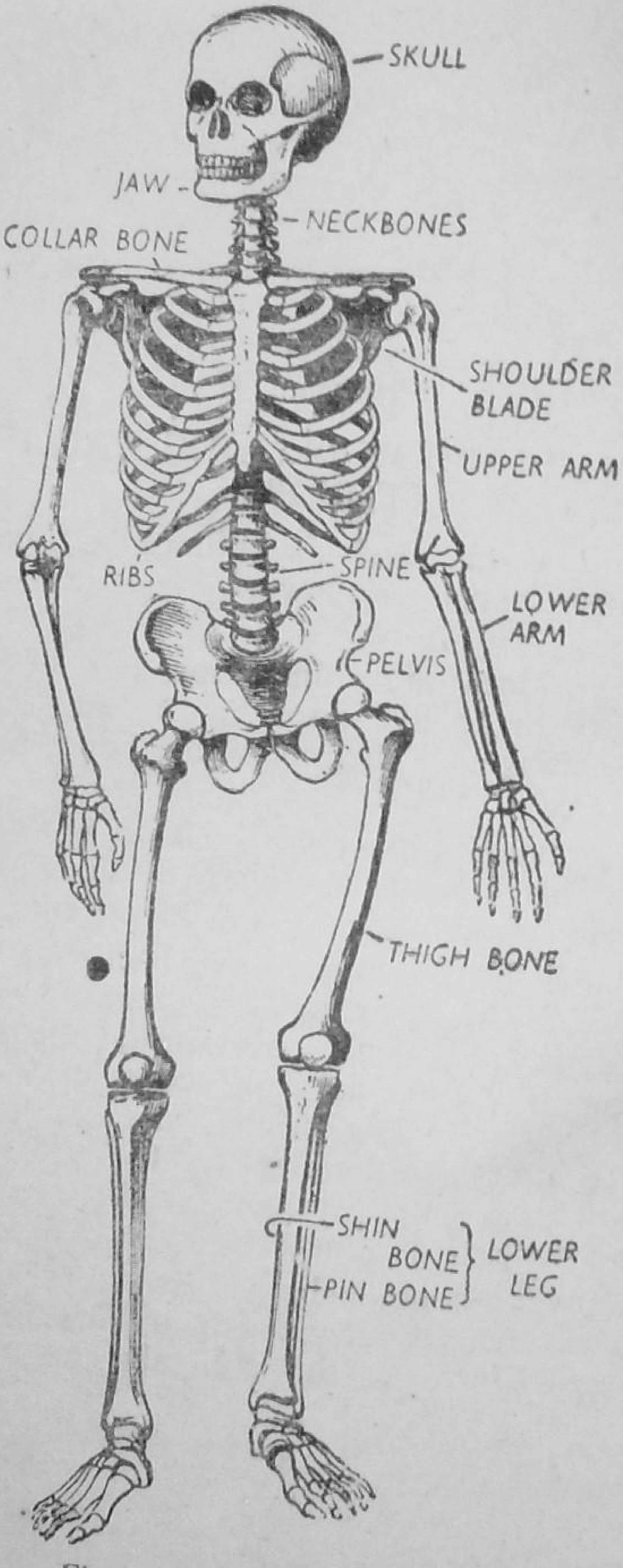


Fig. 1—The Human Skeleton

6. The ribs are joined behind to the backbones. In front the ribs are fixed to the breastbone. There are twelve ribs on either side. They move up and down when you breathe.

7. The collar-bone is joined in front to the breastbone. At the shoulder the collar-bone is joined to the shoulder-blade.

8. The shoulder blade is flat. It is slung to the backs of the ribs by muscles. At the shoulder it forms a shallow socket for the rounded end of the upper arm bone.

9. In the upper arm there is only one bone. In the forearm there are two bones. The two forearm bones are joined to the upper arm bones by the elbow joint. The two forearm bones are joined by the wrist joint to the hand.

10. The hand and wrist are made up of a lot of small bones.

11. The hip bones form a girdle called the pelvis. This is joined to the bottom of the backbone.

12. Hinged to the pelvis at each side are the thigh-bones. They are the biggest bones in the body.

13. The thigh-bones are joined by the knee-joint to the two leg-bones.

14. In front of the knee-joint is a small bone called the knee-cap.

15. The small bones which form the foot are joined to the two leg-bones by the ankle joint.

16. *The Muscles* are fixed to the bones. They are the red meat. They provide the power to move the bones.

17. The muscles are controlled by nerves. These nerves look like white threads. The nerves go from the brain down the spinal cord and then out to the muscles.

18. The muscles are covered by a layer of fat. The layer of fat is covered by the skin.

19. All these bones and muscles must be supplied with oxygen to keep them alive. This oxygen is carried round to the various parts of the body by the blood. The blood gets the oxygen from the lungs. The lungs get the oxygen from the air. This is why we must breathe air to keep alive.

20. *The heart and lungs* are protected by a cage formed by the ribs. The rise and fall of the chest in breathing enables air to pass in and out of the lungs. In the lungs the oxygen of the air passes into the blood stream.

21. The liver, kidneys and bowels are protected by the backbone behind. In front they are protected by the abdominal wall, which is made of muscles.

22. The pelvis, which is made of bones, protects the bladder and the back passage. (Fig. 1).

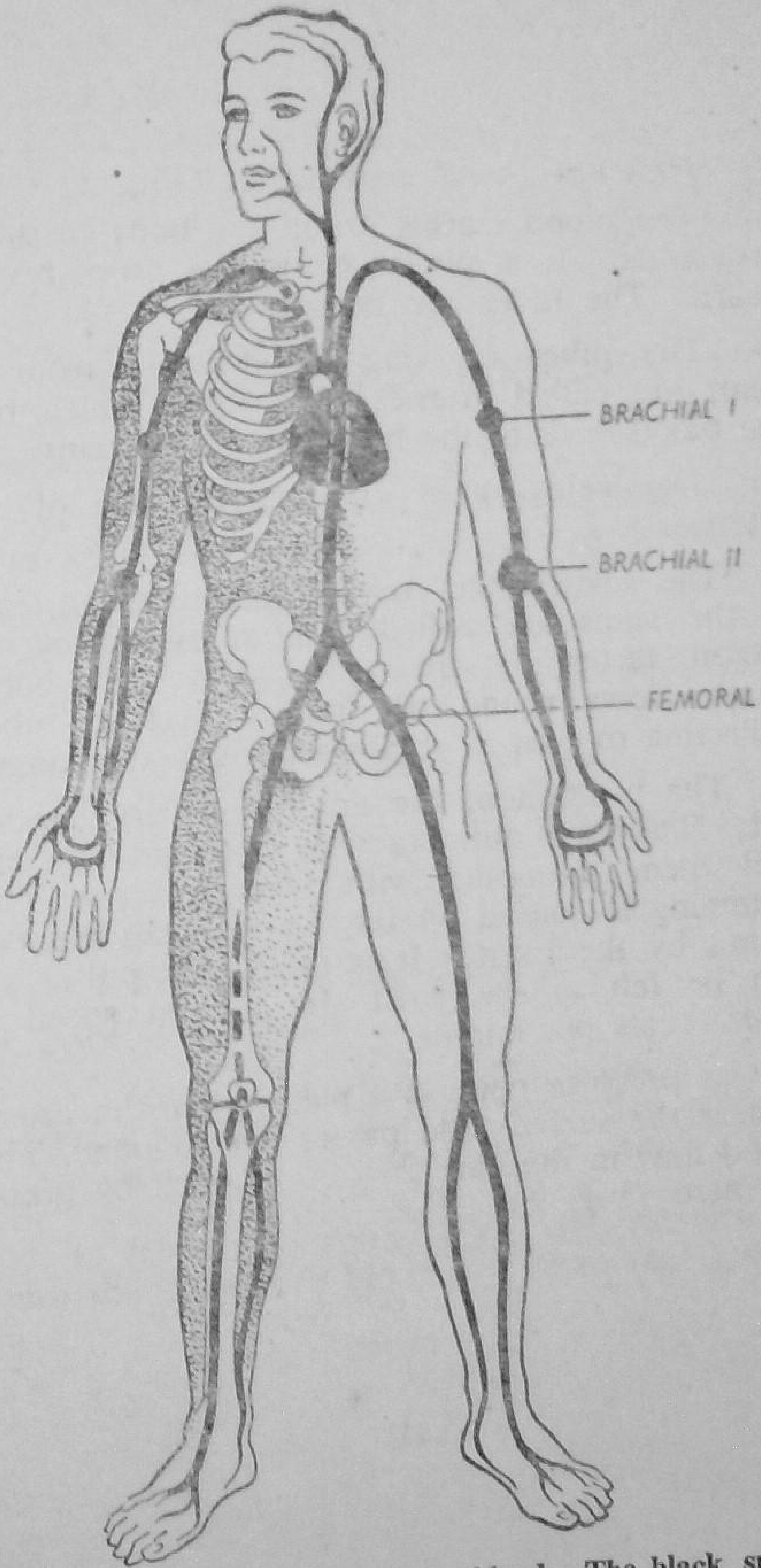


Fig. 2—The circulation of the blood. The black spots denote the pressure points.

23. *How the blood goes round* (Fig. 2).

The blood travels round the body in tubes, or vessels. It is pumped into the tubes by the heart. The tubes are of two sorts.

24. The tubes carrying blood away from the heart are called arteries. The tubes which take the blood back to the heart are called veins.

25. The veins often run by the side of the arteries.

26. The small blood vessels joining the arteries to the veins are called capillaries. They are present throughout the body. The blood continually flows round the body in these tubes, collecting oxygen as it flows through the lungs.

27. The position of the arteries is very important. They are quite easy to find and you can feel them thumping with your finger. This thumping is caused by the blood being pumped round by the heart. It is called the pulse and can be felt at the wrist. Its normal speed is 60-80 beats per minute.

28. A pressure point is a place where an artery is near the surface and passes over a bone. The blood flow in the part may be stopped by pressing here (Fig. 2).

CHAPTER III

DRESSINGS AND BANDAGES

Dressings

1. A dressing is a covering applied to a wound or to an injured part and may be used :

   (a) to assist in controlling bleeding (haemorrhage),

   (b) to protect a wound from further injury, and

   (c) to prevent or lessen infection.

2. The common dressings are provided by

   (a) gauge,

   (b) lint,

   (c) made up sterile dressings,

   (d) cotton wool.

3. (a) *Gauze*—The principal material used in dressing a wound is gauze usually called *surgical gauze*. It is a thin loosely wooven white cloth which can be cut and made into small or large pads to fit over a wound. From its property of being able to absorb blood and secretions oozing

out of a wound it is often called *absorbent gauze*. When it is medicated it may be called *medicated gauze*. Medicated gauze forms the dressing in compact, made-up dressings like the "First Field Dressing" and "Shell Dressing". The latter is the large edition of the former.

(b) If the properties of gauze dressing could be kept in mind these could be improvised for on the spot use from clean coarse clothing. For field use it is most desirable that pads of gauze are duly sterlised. This can best be done in a hospital. If these pads are carefully wrapped in brown paper in cellophane or water proof material and then sterilised and sealed they will stay sterile for a longer period and could be handled and carried as such.

(c) If sterile dressing is not available, clean improvised cloth or cotton dressing can be held near fire so that it becomes brownish. The heat will sterlise it.

4. *Other dressings*

Pieces of lint or a bandage itself could be used to dress a wound.

5. *Cotton wool*

This is meant to further cover and protect the wound, retain secretions, if any, and to keep out contamination.

Bandages

6. Bandages are made by cutting pieces of material to a desired length, shape and size for use in first aid work and surgical practice; the material is usually unbleached calico but may be gauze, linen or flannel. Bandages can be improvised from such things as cotton sheets including Dhotees and Sarees, handkerchiefs and shirts. They are used to keep dressings in position; to give support to injured parts, as arm slings; to secure a broken bone in a limb to its fellow or to the trunk in the case of an upper limb; to fix splints and retain them in position; to make pressure, to stop bleeding, and to reduce or prevent swelling in a joint (as in a sprained ankle). The two varieties of bandages in common use are the triangular bandage and the roller bandage.

7. *The triangular bandage*

Triangular bandages are useful articles of first aid equipment and they consist of pieces of calico or linen, usually 40 inches square, cut across the centre from one corner to another. Each half forms a triangular bandage. The longest edge is called the base, the two others the sides. The upper corner opposite the base is called the point or apex, the other two corners are called the ends.

8. Triangular bandages can be used in the following ways :

(i) As a "whole-cloth", *i.e.*, unfolded, the triangle being spread out to its full extent.

(ii) As a "broad-fold" bandage. Carry the point to the middle of the base, and then fold the bandage again in the same direction.

(iii) As a "narrow-fold" bandage. Fold a broad-fold once, long edge to long edge.

9. As improvisations in place of triangular bandages, scarves (*e.g.*, Boy Scouts' scarves) or pieces of cloth can be used; and ties, braces, straps or belts can be used to secure splints or dressings or as improvised tourniquets.

Application of Triangular Bandage

10. *The large arm sling* (*to support forearm and hand*)

Spread out a triangular bandage, put one end over the shoulder on the sound side, pass it round the neck so that it appears over the shoulder of the injured side, and let the other end hang down in front of the chest. Carry the point behind the elbow of the injured limb, and place the forearm over the middle of the bandage; then carry the second end up to the first and tie them. Bring the point forward and secure to front of the bandage with a pin. (Figs. 3 & 4).

Fig. 3.—Application of large arm sling (first stage)

Fig. 4.—Application of large arm sling (completed)

11. *Improvised slings*

Slings may be improvised by pinning the sleeve of the coat to the garment, by turning up the lower edge of the coat and pinning it, by passing the hand inside the coat or waistcoat and buttoning it, or by using scarves, ties or belts.

Application of triangular bandages to special parts of the body (e.g., to secure dressings)

12. *The top of the head*

Take an unfolded triangular bandage and lay its centre on the top of the head, so that its point is towards the back of the head and its lower border lies along the forehead just clear of the eyebrows. Make a short fold in the lower border and pass the ends round the back of the head above the ears. Cross the ends over the point of the bandage at the nape of the neck; bring the ends to the front again and tie off in the middle of the forehead. Place a hand on the top of the head to steady the dressing and draw down the point until the bandage is taut over the top of the head. Then turn up the point and pin-off on the top of the head.

13. *The chest*

Place the centre of an open bandage over the dressing, with the point over the shoulder of the same side. Fold a three-inch hem under the base of the bandage, carry the ends round the waist and tie them, leaving one end longer than the other. Draw the point over the shoulder and tie it to the longer end.

14. *The shoulder*

Lay the centre of an unfolded triangular bandage on the top of the shoulder, point

upwards, with the lower border across the middle of the arm. Fold in the lower border, carry the ends round the arm, cross them, and knot-off on the outer side. Apply the small arm sling, draw the point of the first bandage under the arm sling, fold it back on itself, and pin over the shoulder. (*see* fig. 5).

15. *The hand*

Place the hand, palm down, in the centre of an unfolded triangular bandage, with the fingers towards the point of the bandage. Bring the point

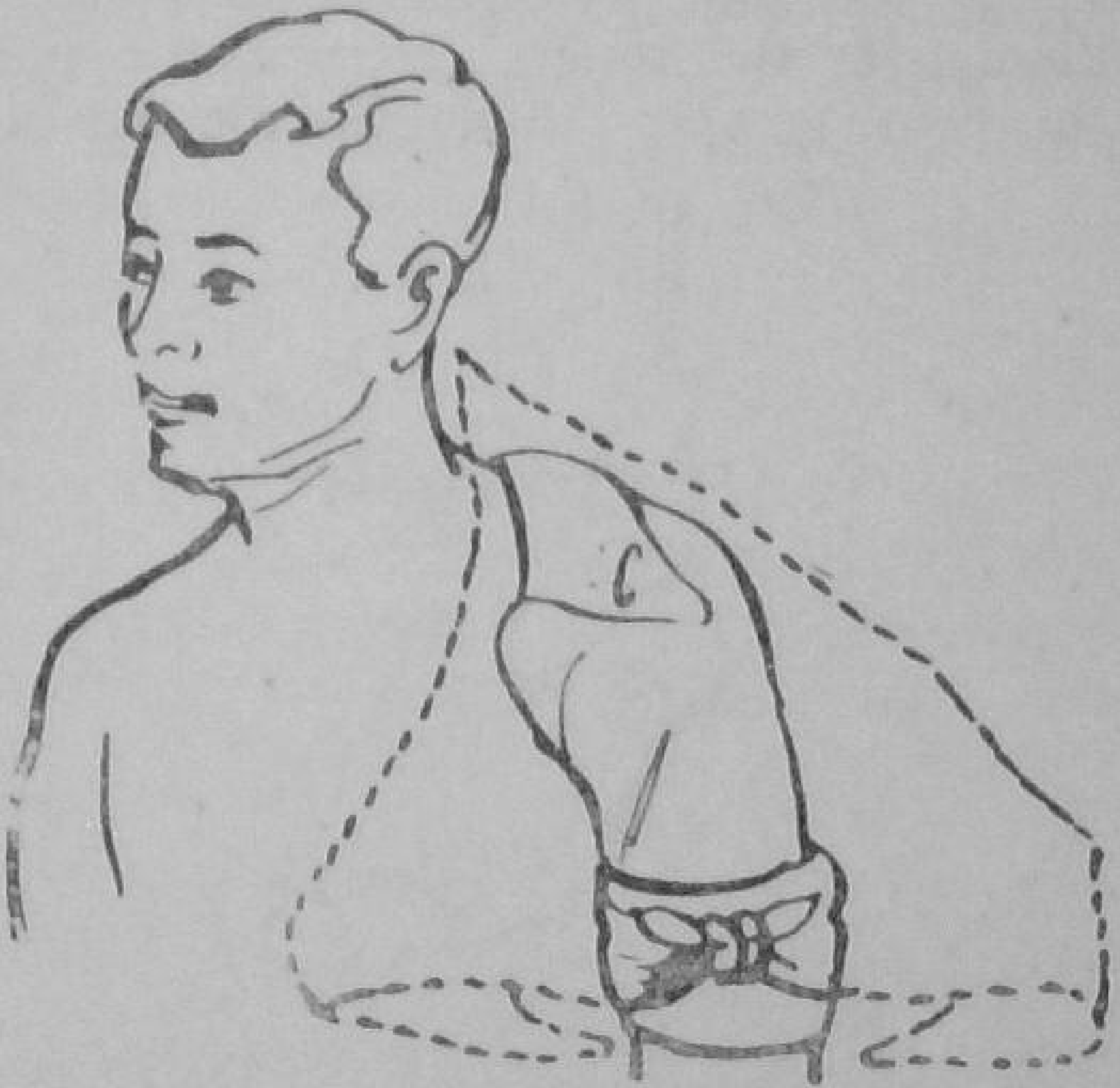


Fig. 5—Application of shoulder bandage

over the back of the hand to the wrist, pass the ends round it, crossing them over the point. Then fold the point towards the fingers and cover it by another turn of the bandage round the wrist. Knot-off the ends in front of the wrist.

16. *The foot*

Place the sole of the foot on the centre of an unfolded triangular bandage with the toes towards the point. Turn the point upwards over the instep; take one of the ends in each hand close up to the foot, bring them forward and cross them over the instep, covering the point. Draw the point upwards to tighten the bandage.

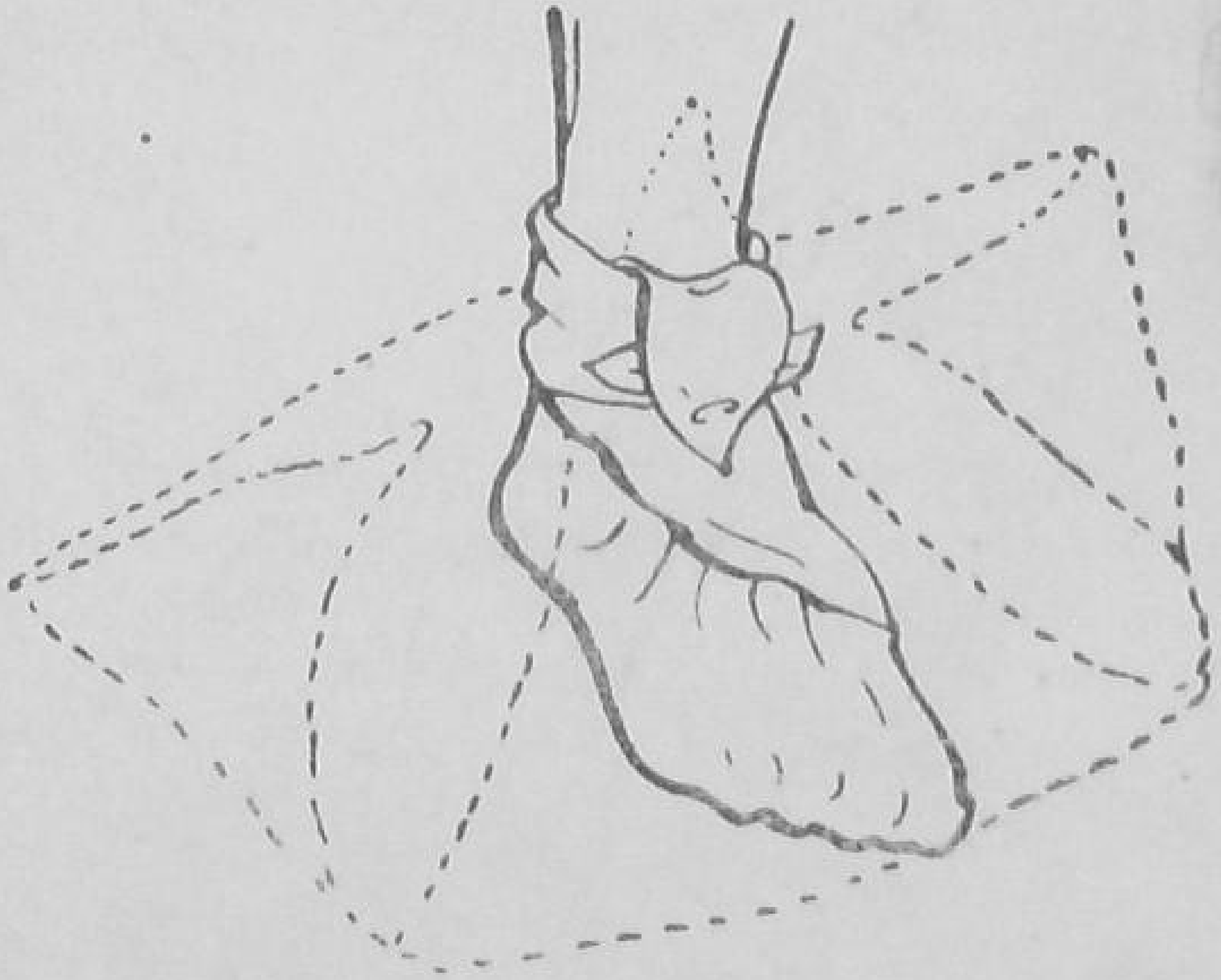


Fig. 6A—Application of bandage to foot

and fold it towards the toes. Carry the ends back round the ankle and cross them behind, catching the base of the bandage. Bring the ends forward and knot-off over the instep. (*see* fig. 6A)

17. *The hip*

Pass a "narrow-fold" round the waist and knot-off in front. Then take an unfolded triangular bandage, put its centre over the hip, point upwards, with its base folded in and lying across the thigh. Pass the ends round the thigh and knot-off on the outer side. Draw the point upwards under the bandage round the waist, turn it down and pin-off (*see* fig. 6B).

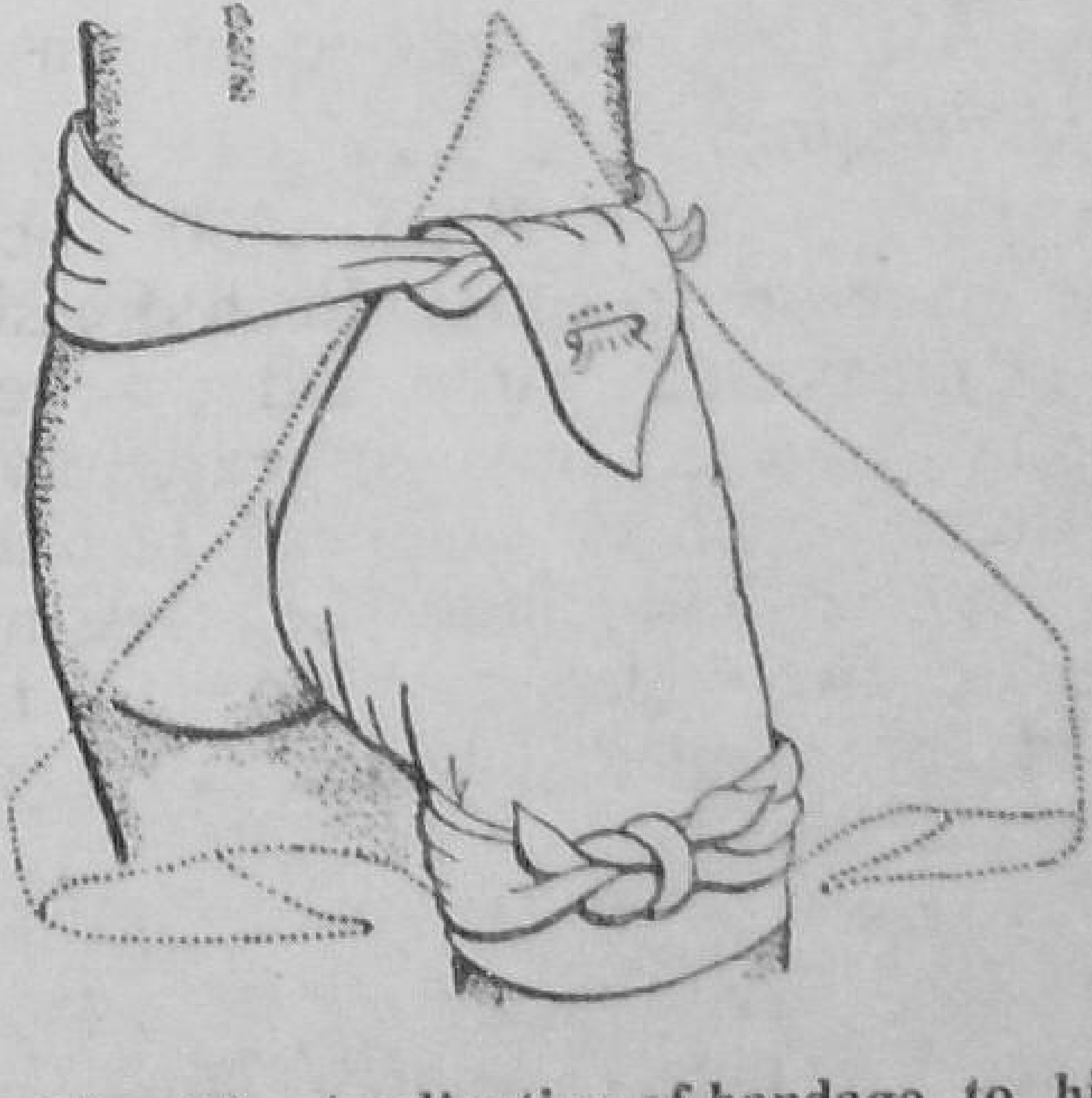


Fig. 6B—Application of bandage to hip

The roller bandage

18. Roller bandages consist of long strips of material, varying in length and width according to the part of the body to which they are to be applied, *e.g.*, for the head and upper limbs 4 to 6 yards long and 2 to 3 inches wide; for fingers, 2 yards long and 1 inch wide; for the trunk, 6 yards long and 3 or more inches wide.

19. For keeping dressings in position or for fixing splints the best material is unbleached calico. Whatever material is used, it should have been washed, as bandages which are stiff or starched are difficult to apply. Bandages of whatever size required are issued rolled and ready for use. When possible, bandages which have been used should be boiled, washed and used again.

First field dressings

20. An outer cover of Khaki cloth encloses two complete made up dressings. Each dressing which consists of medicated gauze and a piece of roller bandage has been sterilised and carefully enclosed in a waterproof cover made of jaconet. When opening and applying hold the dressing by the bandage on two sides and do not touch the medicated gauze piece which is to cover the wound.

Shell dressings

21. This is a bigger variety of First Field Dressing, meant for bigger wounds. Instructions for its use are printed on the Khaki cover.

CHAPTER IV

HAEMORRHAGE

Types of bleeding

1. Haemorrhage or bleeding is amongst the very serious emergencies with which the first aid worker might have to deal. Blood is a life giving fluid and serious bleeding from wounds must be stopped urgently. There are two main types of bleeding:

(a) Oozing, as from shallow wounds.

(b) Serious bleeding. This occurs in spurts or as a continuous welling up of blood from the wound.

Treatment of bleeding

2. *Oozing*

Oozing can be stopped by application of a dressing firmly.

3. *Serious bleeding*

Bleeding from larger blood vessels which shows as spurting or blood welling up in the bottom of the wound, can be stopped by firm pressure over the wound and tight application of

dressing or dressings put one on top of the other dressings, *i.e.*, gauze and cotton or First Field Dressing.

4. *Plugging the leaking vessel*

The principle is exactly the same as plugging a leak in anything else. The way to do this is as follows :

(a) First plug the leaking vessel with your **thumb.**

(b) Then replace the thumb with a suitable plug.

(c) Then bandage up the wound so as to keep the plug tightly in position.

The details of how to do this are as follows :

(a) By far the easiest and most obvious way of stopping a leak is to put your thumb on the hole. It does not matter if your hands are dirty; there is no time to be wasted (you should of course wash your hands and scrub with soap and water whenever you can) where bleeding has to be stopped. The easiest way to find the bleeding point, if it cannot at once be seen, is to take a large grip of the whole wound and squeeze it tightly. This squeezes out the blood and nearly always stops the bleeding for the moment. Then slowly relax the grip; the bleeding starts again and you can see where it is coming from. Put the ball of the right thumb there and press

hard. Bleeding can practically always be stopped this way. Often very little pressure is required.

(b) Having temporarily arrested the haemorrhage with direct thumb pressure the next step is to replace this with a suitable plug. There is no better plug for this than a tightly rolled bandage. The first field dressing contains two dressings complete with bandage. One of these doubled over tightly makes a suitable plug which should now be slipped over the bleeding point and pressed firmly down. A similar pad can be made with gauze. A few such pads should be made in advance and kept ready sterilised in packets.

(c) Then bandage the wound up so as to keep the plug tightly in position. This is done with the other first field dressing or a similarly made dressing. The bandage should be just tight enough to stop bleeding from the wound.

(d) These methods will effectively stop bleeding in most wounds. Occasionally bleeding continues from the bottom of deep wounds when surrounding bony structures make it impossible to find any bleeding point to press on. The only way to treat these wounds is to pack the depth of the wound with the whole of a field dressing which must be tightly packed down with finger into the region the blood is coming from and then bandaged firmly into position. When a

rolled bandage, as described above, is not available, a suitable plug may be improvised (i) by putting four or five knots one on top of another in a handkerchief, or (ii) by tightly rolling up a pebble in any convenient piece of cloth.

(e) A point to remember is that the procedure described is not painful because of the numbing effect of the wound itself in the early stages. There should be no fear of hurting the patient. The sole consideration is to save his life.

(f) IF THE BLEEDING CONTINUES, press on the nearest pressure point above the wound (fig. 2). After 10 minutes stop pressing. The bleeding by then may have stopped.

(g) IF ALL THIS DOES NOT WORK, and you cannot stop the bleeding, you will have to put on a tourniquet. But remember this :

> A tourniquet is a last desperate effort. Use a tourniquet ONLY if you have tried everything else and failed, or if the man has lost a limb.

5. *To put a tourniquet on*

(a) Use a handkerchief, bandage or any piece of soft strong material. Tie it with a half-knot just above the wound and over his shirt or underwear if possible. Do not use a piece of string which is narrow and cuts the flesh.

(b) Next put a stick over the half-knot. Then complete the knot over that.

(c) Twist the stick round and round until the bleeding stops—BUT NO MORE.

(d) Fix the stick in position with a bandage.

(e) Do not cover the tourniquet with anything.

(f) Always tell stretcher bearers or doctor that the patient has a tourniquet on.

(g) If you have a pen or pencil write a 'T' on his forehead and the time, *e.g.*, T.0940 hours.

Bleeding as a rule occurs straight away; but sometimes, especially after a serious wound, it may restart several hours later. Be on your guard for this.

6. *Summary—How to stop bleeding*

(a) Raise the part; apply a firm dressing to the wound.

(b) Apply pressure to the nearest pressure point.

(c) In desperate cases use a tourniquet.

(d) In air raids the urgency of the situation is such that once a tourniquet has been applied it is safer not to loosen it—to leave it on. If, however, the patient's removal to hospital is going to be delayed, it may be advisable to loosen the tourniquet carefully for a few seconds

every 15 or 20 minutes if you have been taught to do so.

Care after bleeding is stopped

7. All wounds expose the inside of the body to the outside germs. Therefore, the application of first field dressing not only stops bleeding but also minimises the risk of infection. Do not remove any foreign body from the wound such as bullet or a piece of shrapnel as they may be acting as a plug, and by its removal the patient may die of sudden bleeding. You should:—

(a) Keep the patient warm but do not overcover him with blankets in hot weather.

(b) Evacuate as early as possible, keeping the head slightly lower than the body during evacuation.

8. Do not give anything to drink to the following types of patients:—

(a) Those with wounds of abdomen (belly).

(b) An unconscious patient or one who cannot swallow.

9. After adequate resuscitation, the patient should be evacuated as early as possible. With severe injuries the patient should not be allowed to walk but be carried on a stretcher.

10. If the wound is associated with a fracture (a break in the bone) the first aid treatment of fracture should be combined with the treatment of the wounds.

11. *Internal bleeding*:—This condition occurs with wounds of the chest or abdomen where the bleeding, instead of coming to the surface, occurs into the cavity of the chest or abdomen. In some cases the injured may—

(a) cough up blood,
(b) vomit blood,
(c) pass blood by back passage or with urine.

In other cases, there is no way of seeing that this is occurring but may be suspected if a man, wounded in the chest or abdomen, later begins to get restless, short of breath and begins to sweat so that the skin becomes clammy. There is little that can be done in the first aid treatment of these cases beyond keeping them quiet, warm, lying down keeping the feet raised, head lowered and getting the patent medical attention as soon as possible.

12. *Bleeding in special places*

(a) WOUNDS OF SCALP—Apply pressure with fingers and hands on the edges of the wound, best of all over a dressing. Later a tight bandage round the head will close the lips of the wound. Sit the patient up.

(b) WOUNDS OF THE TONGUE AND LIPS—Put the cut edges together and press them between the finger and thumb.

(c) BLEEDING TOOTH SOCKETS—Pack a wad of handkerchief inside the mouth over the bleeding socket and make the patient bite on it.

(d) BLEEDING NOSE—

(i) Pinch the nose firmly between the finger and thumb at the junction of the hard and soft parts. If this does not work get the patient to bite on a cork or rolled up handkerchief while still pinching the nose, thus breathing through the mouth.

(ii) Do not lay the patient down. Always sit or stand him up.

Chapter V

CRUSHING INJURY—INJURIES FROM BLAST, WOUNDS OF THE CHEST AND ABDOMEN

1. In war when high explosive or nuclear weapons are exploded a large proportion of casualties is caused by the collapse of buildings due to blast. Of these casualties, some are found to be pinned down by beams, brickwork or other heavy debris across their limbs and other portions of the body and may remain trapped for several hours, especially at night.

2. Some of these casualties, when extricated, show little external sign of injury and may complain of nothing more than numbness and stiffness of the muscles in the crushed part, even though this has been subjected to considerable pressure. Their general condition may appear quite good, both during the time they are trapped and after they are freed. Many recover completely after appropriate treatment and rest in hospital. In some cases, however, "shock" develops within a few hours. With adequate blood transfusion all but the most severe cases survive. In some of these patients, after recovery from "shock", the

kidneys become unable to excrete urine, and if this inability is not overcome the patient will die because of the accumulation of waste products in the body. Such cases are said to have developed "crush syndrome" ("syndrome" being the term applied to a group of symptoms). It should be emphasised that this syndrome only occurs when the blood supply to the muscle has been cut off for some hours. This happens more frequently to the limb muscles, since they are less protected than those of the body. Certain substances derived from the crushed muscle may poison the kidneys. For this reason drinks should be given *at the earliest opportunity* to ensure that the harmful substances are washed out rapidly. This should be done for all persons who have been trapped by debris for one hour or more, as they may possibly develop crush syndrome, whatever their apparent condition when found. They must all be treated as serious casualties requiring urgent attention to avert a serious outcome. Note that giving of fluids is a prophylactic measure, once suppression of urine has developed fluids will have to be restricted.

Action to be taken on encountering casualties trapped beneath debris

3. (i) If there are no signs of any abdominal injury, at least two pints of liquid should be given slowly by the mouth. Hot tea or coffee is usually appreciated but if this is not available plain water

can be given. For the reasons given above, the liquid should be administered if practicable before the pressure is relieved, but in no case must this delay extrication.

(ii) Give the usual treatment for shock. It is advisable to raise a limb which has been compressed, to leave it uncovered, and not to place hot water bottles near it. The application of heat after release causes a sudden rush of blood, with increased swelling in the numbed and damaged limb, and a consequent reduction of circulating blood volume in the body. This increases shock. The circulation should be allowed to return to normal gradually. (Limbs subjected to prolonged immersion in water should be treated in the same way.)

(iii) Attach a label to the casualty and mark it X.

4. All these cases must be despatched to hospital by ambulance, and the ambulance attendant must be given full information about the injury and instructed to notify the hospital authorities immediately on arrival.

Internal Injuries from blast from high explosives

5. The explosion of weapons containing high explosives in the air or under water produces a wave of blast which travels outwards in all directions and can cause damage to the internal

organs. This may result in bleeding which is not discernible (when one has to rely on the symptoms of internal haemorrhage q.v.) or is visible (*e.g.*, blood coughed up from injured lungs; blood from injured bowel passed in the motions etc.).

6. There is usually well marked shock in such cases and the treatment is on the usual lines for this. These casualties have a high priority for removal to hospital labelled X.

7. When it is suspected that the lungs have been injured smoking should not be allowed. When injury to abdominal organs is suspected no food or drink should be given to the patient.

Chest Wounds

8. Often in a battle or an air raid a man has a hole blown in his chest. Air is sucked through the hole into the chest. This is most dangerous. These wounds are known as SUCKING WOUNDS.

Treatment

Plug the wound with a shell dressing or anything you have got. Even a piece of shirt will do. Do not give the patient anything to drink. Put him in the position in which he feels most comfortable. This may be propped up or lying on his injured side. Evacuate him quickly.

Abdominal Injury

9. The most common form of injury to the belly in war is a penetrating wound of the abdominal wall, which may or may not have extended through all its protective layers of skin, muscle and fat and opened up the abdominal cavity itself. A frequent cause of this injury is a piece of metal from any type of missile, or it may be due to fragments of glass, stones or rubble blown through the air by blast from an exploding missile. Although a penetrating wound of the abdomen is most frequently found on its front or side walls, it must be remembered that a wound which involves the interior of the belly may be caused by fragments of metal, etc., which may have entered it through the buttock, chest wall or back, especially when a person has been lying or crouching down when hit. First aid workers must always bear this fact in mind when they suspect an internal abdominal injury, and no external wound is visible on the front of the body. Otherwise they may miss the actual entrance wound elsewhere. Wounds of the belly also occur from machine gun or rifle bullets but these are generally perforating, with an entrance and exit wound.

10. Any wound of the abdomen must be regarded as extremely serious, on account of the important organs contained within it. The chief dangers and immediate cause of death are :

(i) Internal haemorrhage.

(ii) Shock. Any wound of the belly which causes protrusion of the bowel is accompanied by severe shock.

(iii) Infection of the wound by disease germs at the time of injury which frequently causes death or serious illness at a later date.

First aid treatment

11. (i) Lay the patient down on his back on a folded blanket or blanketed stretcher with his knees drawn up and supported on a rolled up blanket placed beneath them. Support his head and shoulders on pillows or rolled up blankets. This position relaxes the abdominal muscles and may prevent more bowel from coming out, if any has protruded.

(ii) Dress the external wound. If intestines protrude from the wound do not attempt to touch or replace them, but cover them at once with a large sterile dressing and bandage firmly but not too tightly. A large first aid or shell dressing is useful but should be covered with a broad-fold triangular bandage over the roller bandage as an extra support. Cover the abdomen with a blanket.

(iii) Do not give anything by the mouth. Just moisten his lips with water or give him a wetted handkerchief to suck.

(iv) Do not move the patient unnecessarily until he is ready to be placed in the ambulance.

Remembering that every movement increases shock, move him with the utmost care and gentleness.

(v) Label patient and mark the label with an X.

CHAPTER VI

FRACTURES

Definition

1. Fractures means a break in the bone. A broken bone is a painful injury causing shock. The man cannot normally move the injured part. The site of the break will be painful to touch. The limb may be crooked and swollen. Sometimes a jagged piece of bone may protrude through the skin or wound. There are two main types :

(a) *Closed or Simple*—When the skin is intact.

(b) *Open or Compound*—When in addition there is an open wound leading to the fracture site. This is much more serious as the interior of the body is open to infection by germs from outside. This occurs in the majority of shell and bullet wounds and severe traffic accidents.

2. The fracture may be an isolated injury as in the traffic accidents or it may be associated with injury to internal organs or damage to muscles, etc., as in shell and bullet wounds and crush injuries.

General

3. The aim of first aid treatment in a fracture is to

(a) prevent further injury through careless handling and examination;

(b) make the patient as comfortable as possible;

(c) keep him warm, quiet and lying down.

4. A first aider must remember certain "DON'TS" in case of treatment of fractures. These are :

(a) Do not let him walk unless the injury is to the upper limb and of mild character till proper first aid has been given.

(b) Do not try to set broken bones, you may do more harm than good.

(c) Do not move him even for a short distance before immobilisation of the injured part.

(d) If you see a bit of bone pushing through the skin, don't push it back.

Fracture of long bones of limbs

5. From first aid point of view this is the most important fracture because much can be done by the first aid worker which will help in final recovery, and cut short the period of

hospitalisation. A high proportion of fractures occur in long bones. The thigh and arm have one long bone and fore-arm and leg have two long bones each.

6. The first aid consists of artificial support to immobilise the limb when these bones are broken. Such a support is called a splint. The first aid in a fracture demands one thing mainly, that the broken limb reaches the surgeon with no more damage than that caused at the time of injury. This is only possible by immobilising the broken bones. From the point of view of first aid the only difference between a closed and open fracture is that in the former you treat only the fracture, as there is no wound, and in the latter you treat the fracture and the wound. First treat wound and then splint the limb.

Fractures of upper limbs

7. Support the elbow and forearm of injured limb in a triangular bandage or a larger handkerchief and bandage the whole limb to the chest. Chest is used as a splint for broken limb and no other splint is necessary. The principle is to fix a fracture so that the joint above the site of break and joint below is fixed.

8. In fracture of forearm bones fix wrist joint and elbow joint. This reduces pain to the minimum. This can be easily done by fixing the arm and forearm to the chest as explained above. A piece of bandage can be used for this purpose.

9. *Fracture of the leg bone or bones*

(a) Use a splint about 2½ feet in length. This can be made from a flat piece of wood. It should be padded on one side with cotton wool and the whole splint then wrapped round by a roller bandage. The splint should be fixed on the outside of the leg with the padded portion next to the skin. It should project a little beyond the heel and a little above the knee and fixed with one bandage above the knee, one below the knee and by a figure of eight bandage over the ankle. The splint can also be improvised from an umbrella, walking stick-handle of a pick and the like, the object being to immobilise one joint above and one below the fracture.

(b) In the absence of a suitable splint use the sound leg as a splint. To do this, hold the two legs together, gently pull on the ankle of the injured side if the two ankles do not come together due to deformity. Tie the two ankles together and then the thighs above the knees.

10. *Fracture of the thigh-bone*

(a) Use a long splint, about 4 feet in length and support the whole leg on the outside from little above the hip bone to a little beneath the ankle. The splint should be padded on the inside as for leg. Tie bandages, at the hip, one above

and one below the suspected site of fracture, one above and one below the knee and one (figure 8) at the ankle. A small padded splint in addition can be used to support the site of the fracture from inside the injured thigh. (*See* fig. 7.)

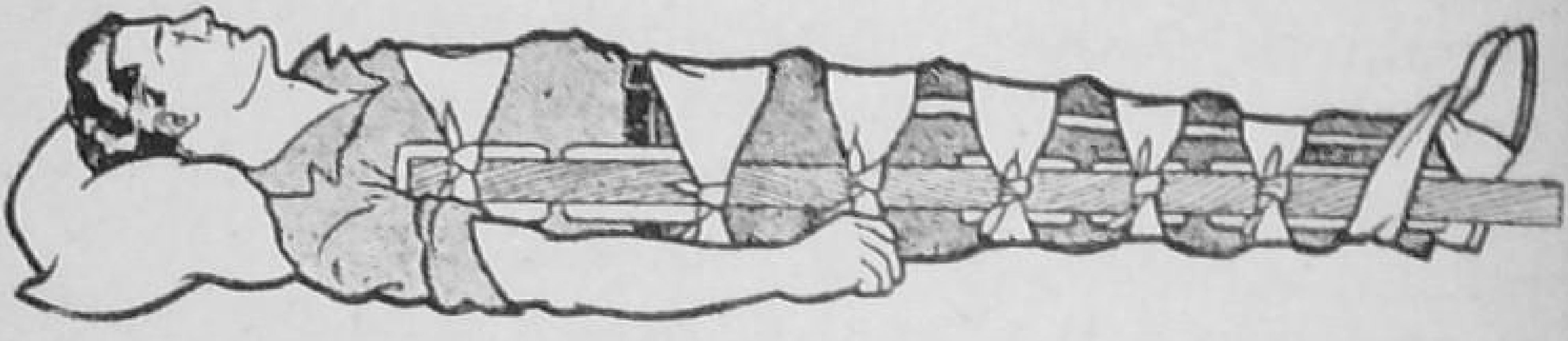


Fig. 7—Treatment of a broken thigh-bone with a splint

(b) In the absence of a splint, pull the injured leg gently down till the two ankles are in line and fix them together as in fracture of the lower leg. Tie the other bandages as in (a) above. (*See* fig. 8). Fix securely so that the combination of two legs moves as one solid block and there is no movement at the site of injury.

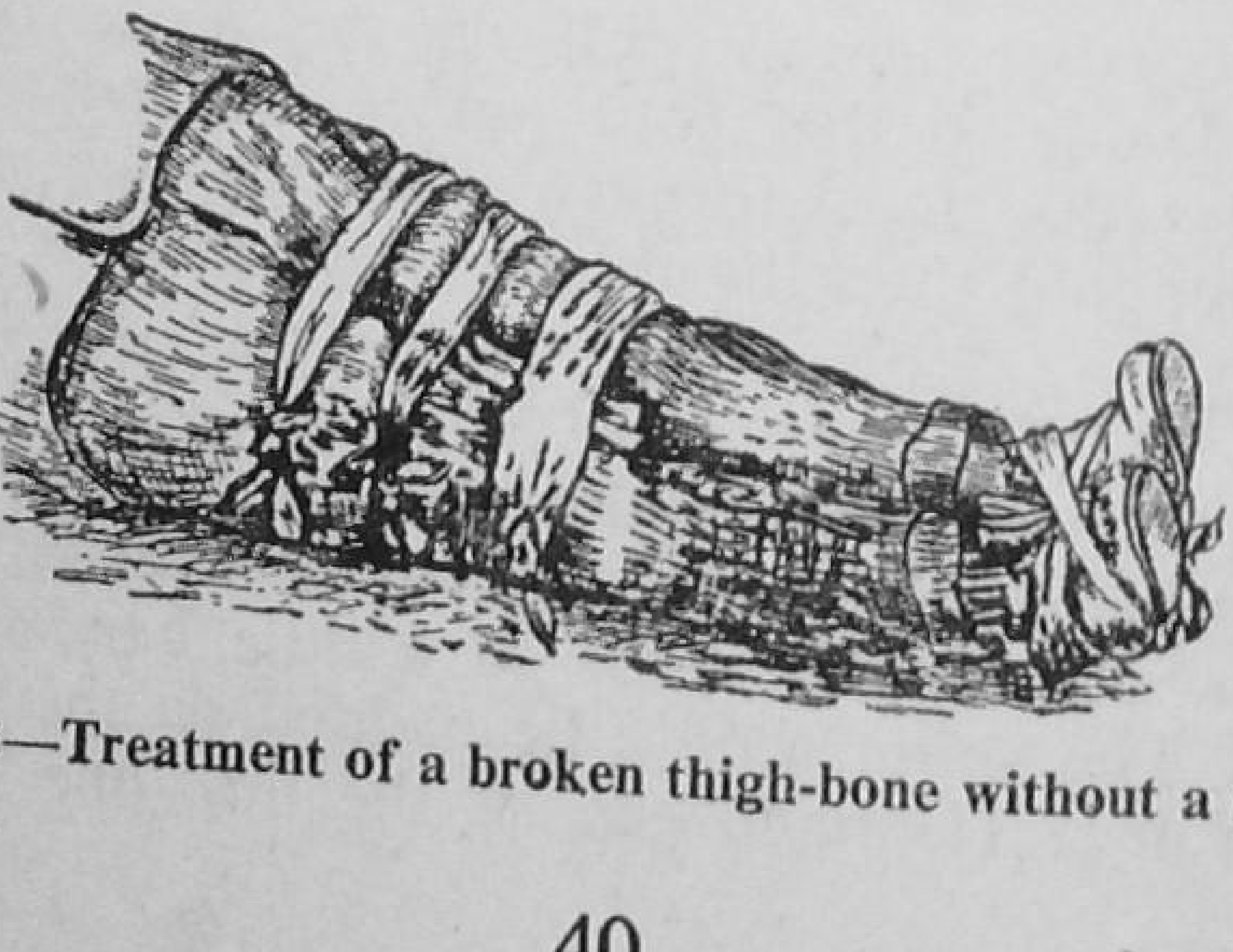


Fig. 8—Treatment of a broken thigh-bone without a splint

11. *Fracture of skull*

This is common in traffic accidents and should be suspected if a man is found unconscious after any accident. Bleeding from mouth, ear or nose especially if no direct injury to these parts is present points to such a fracture.

12. *DON'Ts*

(a) If patient is unconscious do not give anything by mouth.

(b) Interfere with wound as little as possible.

(c) Do not let him get up or walk.

(d) Do not give morphia.

13. *DO'S*

(a) Apply first field dressing or any other suitable dressing—preferably sterile to the head wound.

(b) Keep the patient quiet and warm. The patient with head injury is often restless and may have to be held down with assistance.

(c) Arrange for urgent evacuation with attendant who should be instructed to watch for any obstruction in breathing. Keep him flat. No pillow is allowed. Keep tongue and lower jaw pulled forward as for wounds of face. Turn head to one side.

14. *Fracture Jaw*

Fix jaw with a bandage or handkerchief tied from under the chin to the top of the head.

15. *Fracture spine*—(back)

Suspect fracture spine:—

(a) after a fall or a traffic accident causing direct or indirect injury to the back.

(b) When shell or bullet has passed through the back.

(c) If the patient has, in addition to pain in the back, loss of power and loss of sensation in the lower limbs it points to a possibility of broken spine with injury to the cord.

16. *DO's*

(a) The danger in these patients is pressure on the spinal cord which runs down the bony canal in the spine. This is more likely to occur if the spine is bent forward and less likely if it is bent backward. Hence carry the patient in the prone position.

(b) It is most important in a fracture of spine to ensure that no further injury occurs between the time of injury and his arrival at surgical centre either in rendering him first aid or during transfer. If proper first aid is not given it may result in crippling the patient for life.

(c) While moving a patient to a stretcher, movements and jerks should be kept to a

minimum. Holding the stretcher in close contact with the patient's body, carefully turn the stretcher and patient as one.

(d) Fix him on a stretcher with blankets round him in such a position that he is comfortable.

(e) Watch for difficulty in breathing.

(f) Evacuate him early.

17. *DON'TS*

(a) Do not allow him to walk or sit up if a spinal fracture is suspected.

(b) Do not unduly move him from the place of injury.

(c) Do not shift him from one stretcher to another during evacuation.

18. *Sprains and Dislocations*

It is difficult to be sure that a bone is NOT broken. Give the same treatment as fracture and leave it to be dealt with by the doctor.

CHAPTER VII

SHOCK AND COLLAPSE

1. Shock or collapse is a condition which follows all severe injuries. There are two kinds, an early which takes the form of faintness and often sets in as a reaction soon after the injury has been received and the excitement of the moment wears off, and a late which sets in some hours afterwards. This latter form is very serious and may threaten the life of a wounded man. Bad news or an unpleasant sight such as one's own wounds may cause the first type of shock.

2. *How to recognize shocked patient?*
   - (a) He will be pale and clammy;
   - (b) His pulse at first may be slow; later would be fast and faint;
   - (c) He will look frightened, anxious and may be shivering.

3. Adequate first aid treatment comprises "restorative measures". These minimise the early type of shock and prevent the development of the more serious form.

4. Shock in some form follows all severe wounds and injuries. Certain factors greatly increase the liability to shock. They are :—

(a) Loss of blood.

(b) Cold.

(c) Unnecessarily disturbing or moving the injured man.

(d) Loss of fluid such as occurs after severe burns, crush injuries, severe vomiting, and diarrhoeas and prolonged sweating.

(e) Pain.

5. If these conditions can be prevented the late and dangerous form of shock is less likely to occur.

6. The rules then to be remembered for all cases of wounds and injury are, in order of importance :—

(a) Stop any bleeding AT ONCE.

(b) Keep the man warm by any possible means. Shelter from the wind and weather is of great importance. In hot weather, protection from the sun takes the place of protection from cold. The patient should be placed first on his back with the head low and any constricting clothing should be loosened.

(c) Having applied the necessary first aid treatment, disturb the injured man as little as

possible. Don't interfere with him, make him lie still and leave him alone.

(d) Fluids by mouth should be restricted in spite of the fact that the patient may be thirsty. This is particularly important when the patient has an abdominal injury or he is likely to receive an anaesthetic for the treatment of his injuries and in severe shock because it will give rise to vomiting. A cup of hot sweet tea or coffee would be welcome where shock is of the mental type made worse by nervousness and fatigue. In shock due to severe injury or loss of blood, small sips of water, giving of small pieces of ice to suck, or sucking on a wet handkerchief may be allowed to satisfy feeling of thirst.

(e) Try to minimise pain. Rest for the injured part by adequate splinting is the best way of reducing pain.

CHAPTER VIII

BURNS/SCALDS

1. *Burns and Scalds*—Burns are caused by dry heat, for example fire. Scalds are caused by wet heat, for example boiling water, hot oil or steam. Treatment is same for both.

2. The aim of the first aid treatment of burns is to :—

(a) Protect the burnt area.

(b) Give the patient complete rest.

(c) Treat shock.

First Aid

3. (a) Apply dressing to burnt area—either shell or first field dressing or triangular bandage will do. If there is extensive area of burns, cover exposed area with towel, clean sheet, Dhoti or Saree. Do not strip the patient.

4. *DO's*

(a) Lay the patient flat, give him plenty to drink and keep him warm.

(b) Treat him as a case which may develop severe shock.

(c) Take him early to doctor. He needs morphia and restorative treatment early.

5. *DON'Ts*

(a) Do not burst blisters intentionally.

(b) Do not remove his clothing to apply dressing or to examine him.

(c) Never apply ointment, oils, ghee, lotions, ink or even antiseptics to burns.

6. *Some special types*

(a) *Electric burns*—Treat as above. BUT REMEMBER, if the patient is NOT breathing give artificial respiration first.

(b) *Phosphorus burns*—Phosphorus is contained in incendiary bombs. Small pallets will in that case get embedded in flesh. Phosphorus is also widely used in industry.

Treatment

Flood the burns with water. Remove the pallets of phosphorus, if possible, with a wet cloth. Place a very wet cloth or dressing over burns and keep it wet.

(e) *Acid or Alkali Burns*

Treatment

Flood the burns with water and apply a dry dressing.

Chapter IX

UNCONSCIOUSNESS

1. *An unconscious man* is in a state resembling sleep. Sleep is a natural form of unconsciousness from which one may be easily roused. In unnatural or dangerous forms of unconsciousness a man may be completely unrousable, or may be roused only with difficulty. A man who is knocked in the boxing ring is unconscious. So is a man who faints on the parade ground.

There are many causes of unconsciousness. For instance, a blow on the head, an epileptic fit, too much beer or spirits or certain diseases.

Treatment

Lay the man down in the coma position, *i.e.*, prone with face down with pillow or padding under the chest. This position is the best for all unconscious people because it keeps the tongue from falling back into the throat and prevents vomit from running into the windpipe and causing choking (*See* fig. 9).

Remove his false teeth, if any, tie them in a handkerchief and put them in his pocket. Loosen the clothing around his neck and waist. Make him comfortable. Do not try to give him drinks. Get him medical aid as quickly as possible. If his breathing stops apply artificial respiration.

2. *Drowning*

When a half drowned man is taken from the water he may seem to be dead. He may not be breathing. You may not be able to feel his pulse. But, unless he is quite stiff, you must try to revive him however hopeless it might appear.

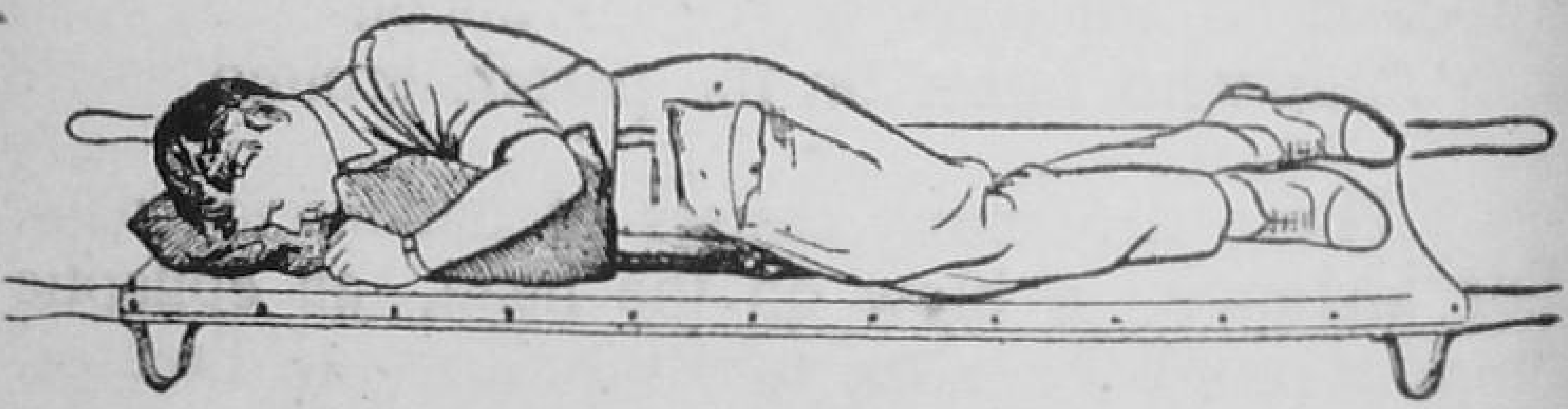


Fig. 9—The coma position

Treatment

Waste no time. Every second counts. Lay him face down. Quickly remove false teeth, or any other obstruction such as seaweed. Loosen the clothing round his neck but don't bother to remove clothing.

Lift his hips from the ground for a few seconds to drain water from his windpipe

and lungs. Start artificial respiration. Remember you may have to keep this going for many hours. Meanwhile send for medical aid.

3. *Poisons*

Some poisons, for instance an overdose of sleeping tablets, cause unconsciousness. Some, like strong acids or alkalis, burn the stomach and intestines. In these cases you may see burns round the mouth and there is a pain in the chest and region of the stomach.

Treatment

If at all possible get the patient to a doctor quickly.

If he is conscious and has swallowed an acid or caustic alkali, give him plenty of water or milk to drink. In all other poisons make him vomit by giving him two tablespoonful of salt dissolved in a cup or glass of water. If he is unconscious do not try to give anything by the mouth. If his breathing has stopped start artificial respiration immediately.

4. *Electric Shock*

An electric shock may kill a man. He may become unconscious and stop breathing. Where the live wire touches him he may be burnt. To

remove a casulty from a live wire act as follows :

If you cannot switch off the current, INSULATE YOURSELF FIRST.

If possible stand on some dry rubber, dry lino, dry bricks, dry wood, or dry straw. You MUST protect your hands. Use a folded newspaper, dry clothes or a rubber raincoat or groundsheet and pull him away from the current.

If you cannot do this then try and push him away from the current with a stick.

DO NOT use anything made of metal or you will get a shock too.

Once clear, if he is not breathing, quickly start artificial respiration. Keep this up even if he seems dead. It may take many hours to get him round. After recovery treat for shock. Treat burns in the usual way.

5. *People stuck by lightning*

Treat as above but remember other injuries may be present.

6. *Strangulation—Suffocation*

People who have been strangled or suffocated go blue in the face. They may froth at the mouth. The veins in the head and neck will stand out. The eyes may be bloodshot.

Remove the cause, such as a cord around the neck. Look inside the mouth, remove false teeth and pull the tongue forward. Give artificial respiration. Treat for shock.

7. *Choking*

If a man swallows a piece of food or foreign body and it goes down the wrong way, it may stick in the entrance to his windpipe and choke him. Children sometimes swallow boiled sweets and choke in this way.

Treatment

Quickly bend the patient over, then thump him on the back. The best thing to do is to lay the patient over the seat of a chair. If it is a child, lift him up by his heels—the marble or sweet should fall out of the windpipe.

8. *Coal gas poisoning or carbon monoxide poisoning*

Coal gas is used in domestic stoves and is often used by people who want to commit suicide. To get a man out of a gas-filled room you must be quick. Hold your breath and run in as far as you can, keeping low. Get the man into the fresh air. His face may be a cherry-red colour. Apply artificial respiration immediately. Treat for shock, keeping the patient warm. Don't forget, the standard respirator does NOT protect you from carbon monoxide.

CHAPTER X

ARTIFICIAL RESPIRATION

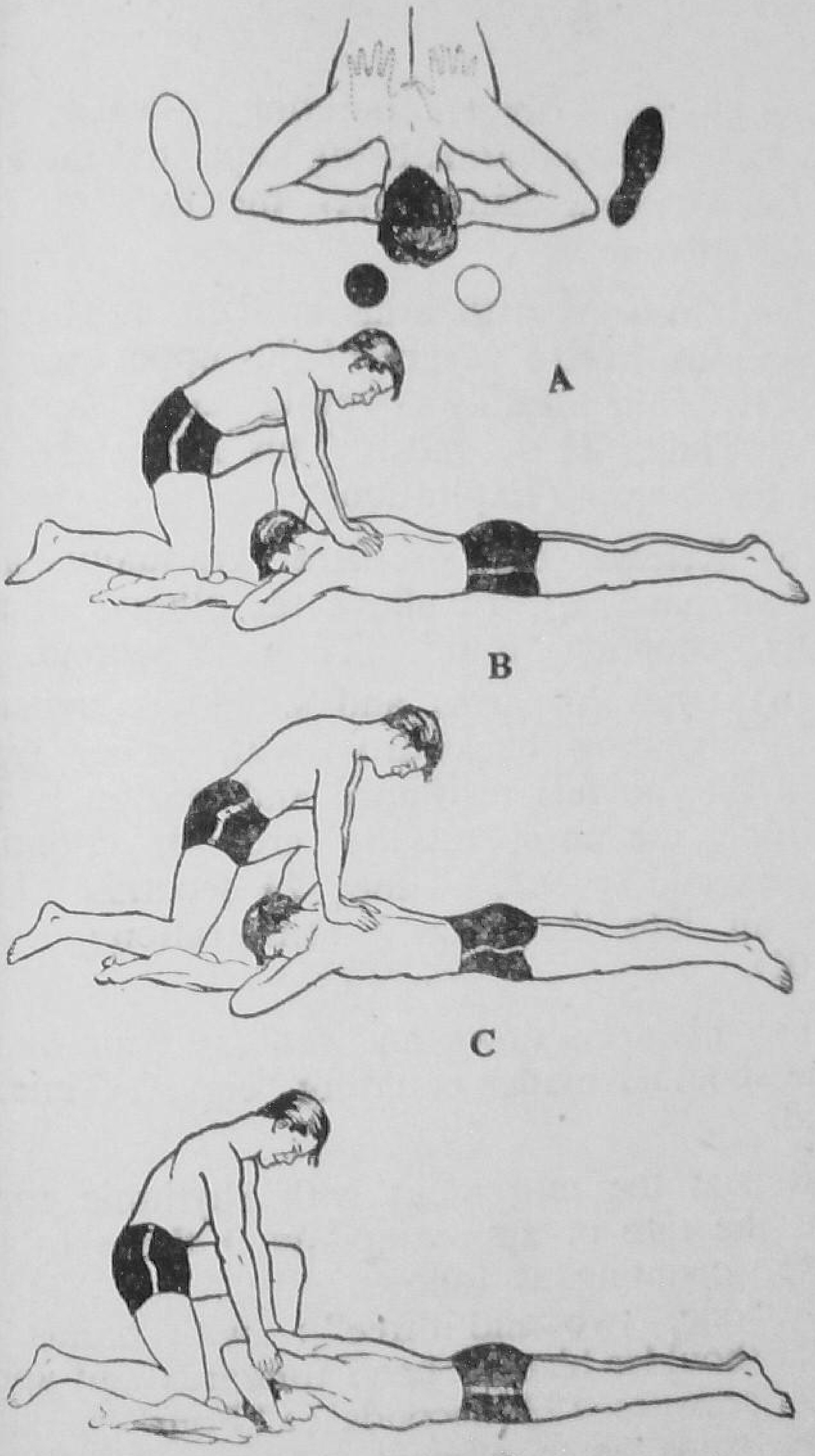
1. *Artificial Respiration by the Holger Nielsen Method (Fig.* 10 *A-D)*

A. (a) Begin at once. Every second counts. Lay the patient face downwards with arms bent and forehead resting on his hands. To keep his mouth and nose free from obstruction it may be necessary to turn his head slightly to one side. If on sand or soft ground, put a handkerchief or other material under the head and hands.

(b) Give one or two firm thumps with the flat of the hand between the shoulders to bring the tongue forward and clear the throat.

(c) Kneel at his head, placing one knee near the head and the other foot alongside the elbow. The operators' mid-line should be in line with that of the patient. From time to time this position can be altered by changing the kneeling knee. Alternate positions are shown in fig. 10 A-D.

(d) Place your hands on his shoulder blades with thumbs parallel to and touching on



Figs. 10 A—D. Holger Nielsen method of artificial respiration.

the mid-line and fingers pointing towards the casualty's feet, your arms being kept straight and the heels of your hands over the tops of the shoulder blades.

B. Bend forward with arms straight and apply light pressure by the weight of the upper part of your body while steadily counting "one, two and three". Time, 2½ seconds. This forces the air out of the lungs. (Expiration).

C. (a) Release the pressure gradually and slide your hands to just above the elbows of the casualty, counting "four". Time, 1 second.

(b) Draw his arms and shoulders towards you by bending backwards with your arms straight till you feel resistance and tension, without lifting the chest off the ground, counting "five, six and seven". Time, 2½ seconds. This draws air into the lungs. (Inspiration). *See* fig. 10D.

D. Lay his arms down and replace your hands on the shoulder blades counting "eight". Time, 1 second.

E. Repeat the movement with rhythmic rocking at the rate of approximately 9 times to the minute, counting as follows :

> "one, two and three" : with hands on shoulder blades, bend forwards and apply pressure (2½ seconds); "Four" : slide hands on to elbows (1 second); "Five,

six and seven" : bend backward raising patient arms and shoulders (2½ seconds); "Eight" : lay arms down and place your hands on shoulder blades (1 second).

F. When breathing begins again stop the back pressure and continue the arm raising and lowering alone at the rate of 12 times to the minute, counting as follows:

"One, two and three" : arm raising (inspiration, 2½ seconds);

"Four, five and six" : arm lowering (expiration, 2½ seconds);

G. (a) If there are chest injuries, do the arm raising and lowering procedure only, at the rate of 12 times a minute.

(b) If there are arm injuries, place arms at sides of body. Press on shoulder blades in normal ways (expiration). Place your hands under casualty's shoulders and raise (inspiration).

(c) If arms and chest are both injured, place your hands under the casualty's shoulders and raise and lower for inspiration and expiration.

H. The amount of pressure you can safely put on the shoulder blades varies. For an adult 24 to 30 pounds is correct. For slender women, and half-grown children 12 to 14 pounds is enough.

For infants it is best to place the casualty on a table with the arms by the side and stand

at his head. Then press on the shoulder blades with the thumbs and raise the shoulders with the fingers. The speed should be 15 times a minute, and the pressure not more than 2-4 pounds.

It is essential to practise correct pressure by using a weighing machine or a modified spring balance. It is very easy to press too hard, and if you do, it may cause damage. Even 30 pounds does not require much pressure.

J. Never stop artificial respiration until the casualty has started to breathe normally, or until a doctor says he is dead. Go on for two hours or more if necessary.

After recovery transport him to hospital lying down.

2. *Mouth to Mouth Breathing (Expired Air Resuscitation)*

Mouth to mouth breathing is an emergency life saving method of artificial respiration.

One has to be prepared to save a life in any unconscious and non-breathing person such as may occur in cases of drowning, gas piosoning, electrical shock, head injuries and poisoning due to alcohol, barbiturates and opium.

3. This method of artificial respiration has been found to be the best means of ventilating the lungs of such patients.

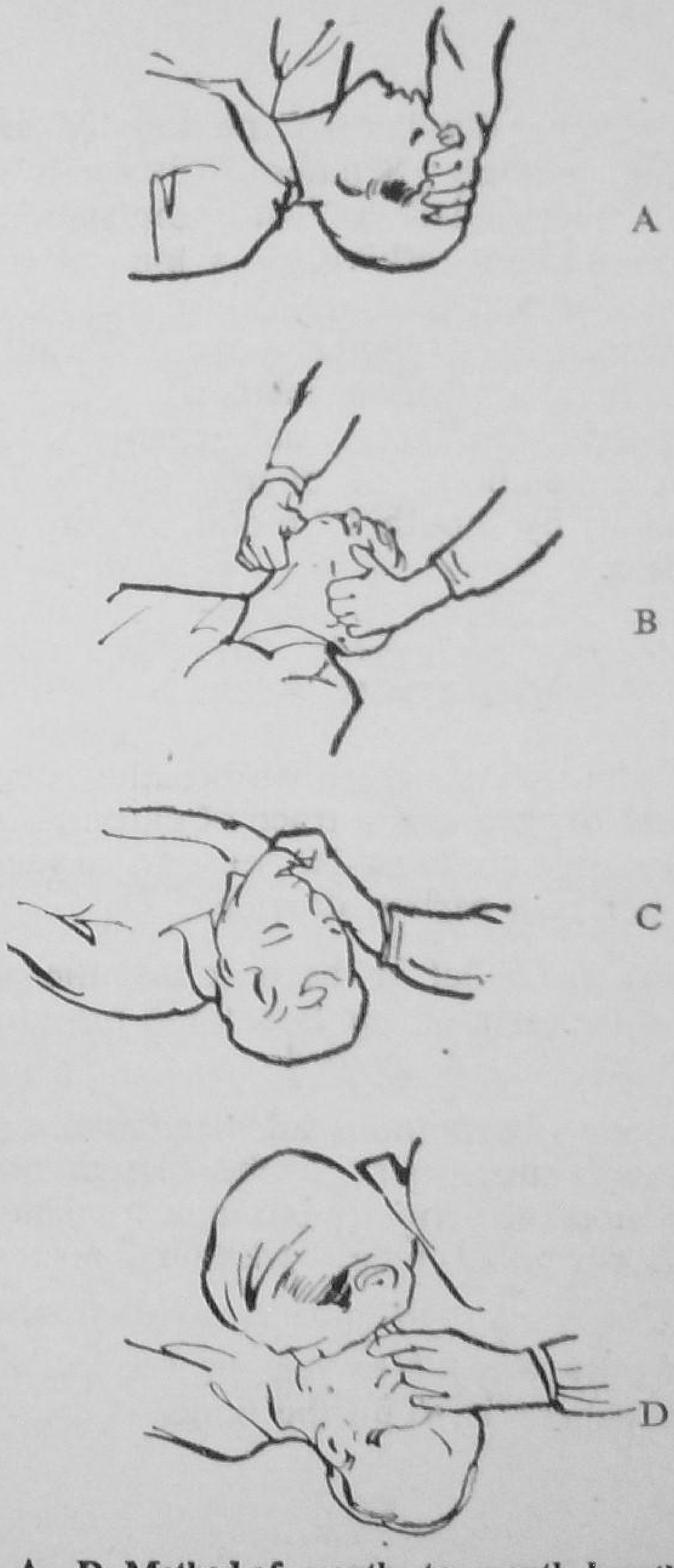


Fig. 11 A—D. Method of mouth to mouth breathing.

4. More generally known methods of artificial respiration, namely Schafer's/Silvester's/Holger Nielsen's overshadowed the applicability of mouth to mouth breathing for a long time. Now it has been proved that air forced into the lungs under pressure is a better means of ventilating the lungs than any other method. This can be accomplished effectively and easily with the minimum expenditure of energy and with very little training by mouth to mouth or expired air resuscitation.

Theoretical Aspects

5. The atmosphere which we breathe in contain 21 per cent oxygen and a trace of carbon dioxide. Our expired air contains 16 per cent oxygen and 4 to 4.5 per cent carbon dioxide.

6. It was the belief in the past that the carbon dioxide in the expired air is a toxic product and would be harmful if inhaled.

7. Scientific observations and studies have now proved that expired air can be blown into the lungs of apnoeic (non-breathing) patients for prolonged period of time, without any harmful effects.

8. The only way of saving the life of a non-breathing patient is to fill the lungs of the victim

forcibly with air. This would require the use of bellows, a suitable mouthpiece and connections.

9. But the human lung of the first aid worker would serve the purpose of bellows and his mouth the necessary mouth-piece. As such mouth to mouth breathing would be a most effective method of reviving non-breathing victims.

10. Besides the donor (*i.e.*, the person who blows air into the lungs of a non-breathing victim) would naturally take a very deep breath to provide effective bellows action, and thus reduce the amount of carbon dioxide and increase the amount of oxygen in his expired air.

Advantages

11. Mouth to mouth to airway method of artificial respiration is now proved to be superior to that of other manual methods.

12. It is very easily performed by a single person for longer periods of time than other known methods without fatigue.

13. It enables constant observations of the chest movements for the best control of breathing, and also makes possible detection and correction of any obstruction to air passages.

14. This method enables quick supply of oxygen to the lungs. Deepest levels of the alveoli of

the lungs can be easily ventilated even during transport.

Practical instructions of the method of mouth to mouth breathing (or expired Air Resuscitation) (*See* fig. 11—A—D).

15. Mouth to mouth breathing or expired air resuscitation can be carried out either directly from donor to recipient by application of mouth to mouth or through the introduction of an airway known as RESUSITUBE (Johnson & Johnson) into the victim's mouth.

A. *Direct mouth to mouth method.*

1. Place the victim in the supine position.

2. Keep the air passages clear by turning the head to one side, opening the patient's mouth and clearing it of water, saline, mucus or blood, a lot of which might have accumulated in the back of the throat. (fig. 11-A).

3. If the jaw is rigid try to force the mouth open by pressure on the gum behind the last molar tooth of the lower jaw. When the upper air passages are thus cleared, tilt the head backward and force the jaw forwards from the angles of the jaw in front of the ears. This would prevent mechanical obstructions to the upper air passages. (fig. 11—B—C).

4. Then hold the chin up and forward with one hand and pinch the nostrils of the victim with the other. (fig. 11-D).

5. Take a very deep breath and apply your mouth to that of the victim, and blow into his mouth, until the chest of the victim moves up indicating filling of the lungs. (NEVER ALLOW THE CHIN TO SAG.) (fig. 11-D).

6. When the chest has moved up, withdraw your mouth and allow the chest to slink back.

7. Repeat this process every three to four seconds until the victim begins to breath again or until he is taken over by a medical attendant. This method can be continued in an ambulance during transit of the patient from the site of accident to the nearest medical centre.

NOTE :—BLOW GENTLY IN THE CASE OF CHILDREN.

B. *Mouth to Airway breathing by the use of Resusitube* (Johnson & Johnson)

1. Place the victim in the supine position.

2. Keep the air passages clear by turning the head to one side, opening the patient's mouth and clearing it of water, saline, mucus or blood, all of which might have accumulated in the back of the throat.

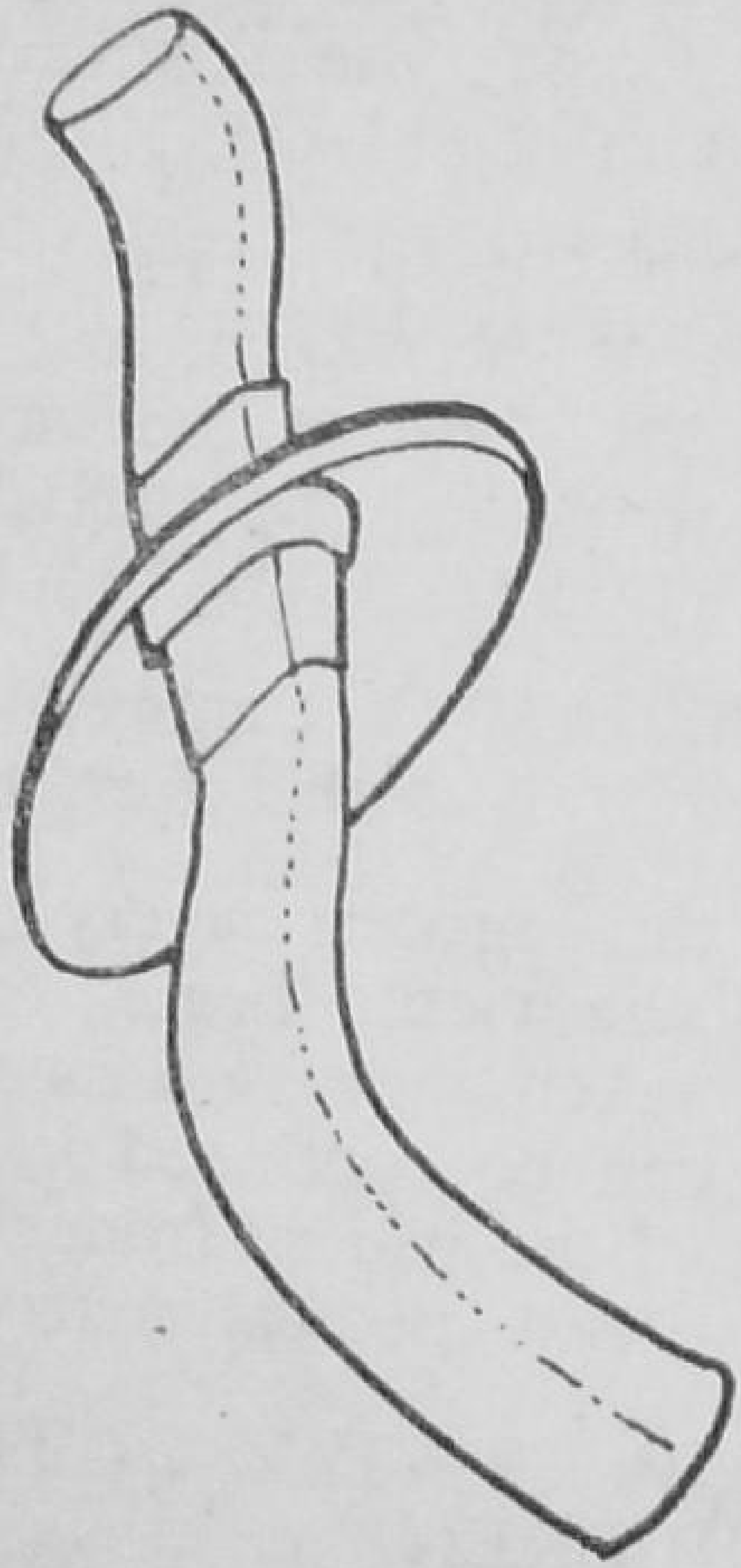


Fig. 12—Resusitube (Johnson and Johnson)

3. Open the mouth now and insert the Resusitube gently over the tongue. Keep pulling the chin forward and upward with one hand, pinch nostrils with other and blow into the mouth piece as indicated above until the victim's chest rises on blowing in.

4. Then withdraw the mouth and allow the chest to sag and repeat the process every 3 to 4

seconds until the victim breathes naturally or reaches a medical aid post.

This procedure can be carried out even during transit in ambulance.

NOTE :—1. DO NOT USE RESUSITUBE ON CHILDREN UNDER 3 YEARS.

2. USE THE LARGER END OF RESUSITUBE FOR ADULTS AND SMALLER END OF THE TUBE FOR CHILDREN.

CHAPTER XI

EFFECTS OF CLIMATE

EFFECTS OF HEAT

1. *Heat Stroke*

Heat stroke must be suspected if, during hot weather, a man feels queer, sick, (actually vomits or has a feeling of vomiting), has high fever and a dry skin. He passes to unconsciousness quickly, if not treated.

2. *First aid*

(a) Make him drink as much water as possible (add ¼ teaspoonful of salt to each glass of water).

(b) Do not put him in a closed shelter but put him in open shade. Strip him of all clothes. Pour cold water and fan him.

(c) Evacuate him to a heat stroke centre as soon as possible.

EFFECTS OF COLD

3. *Frost Bite*

Frost bite occurs in very cold climates.

The exposed parts are affected—*e.g.* fingers, toes, face and ears. The parts feel dead and numb. They look white and stiff at first. Later they become reddish-blue and swollen.

Treatment

Use the body heat to bring the parts to life again. Put frost-bitten fingers under the armpits. Put frost-bitten toes under another man's body. Put a warm hand on a frost-bitten patch of the face. Don't rub with snow. Don't use a hot water bottle or open fire to warm a part but hot water bottles can be applied to the trunk with proper covering and not too close. This will increase blood flow to the extrimities which are usually affected. Handle all the frost-bitten parts very gently. If the skin is broken apply a dressing. Treat the man for shock. Do not give morphia. Smoking is NOT permitted. Encourage sleep and rest and give Aspirin for relief of pain.

———

CHAPTER XII

OTHER EMERGENCIES

1. *Pain in the Abdomen*

A very bad pain in the region of the stomach may be caused by appendicitis, ulcers and the like.

Treatment

Lay the man down. Apply a covered hot water bottle to the abdomen but be quite sure it isn't so hot that it will burn him. Do not give drinks or food. Do not give any opening medicine. If he is thirsty, moisten the mouth with sips of water only. Raise his knees—this may help to relieve the pain. Get him to a doctor quickly.

2. *Burns and Scalds of the Eye, and Grit in the Eye*

Burns and scalds of the eye can cause blindness. They are very serious.

Treatment

Wash out the eye thoroughly with clean water, with the patient seated, tilt the man's

head backwards and gently pour water into the eye at the edge nearest the nose.

Next cover the eye with a pad or clean handkerchief and bandage and get him off to a doctor. Warn the patient never to rub his eye as this will make it worse.

3. *The Ear*

If a man gets something solid in his ear never try to get it out. This is a job for the doctor.

If he has an insect in the ear, put in several drops of any pure oil (but not paraffin oil). This will kill it and may float it out of the ear hole. If it does not, get the patient to a doctor.

4. *Burst Ear Drum*

The ear drum may be burst by gunfire or a blow on the ear. The patient will have severe earache. He will be deaf. Blood may run from the ear.

Treatment

Cover the ear with a dressing or handkerchief. Do not plug the ear. Warn the patient not to blow his nose. Get him to a doctor.

5. *Animal Bites,* e.g., *Dog and Cat*

A dog bite is a dirty wound.

Treatment

Apply a dressing. A dog may have rabies and dog bites need special care. Don't stop the bleeding. This will help wash out the germs. Wash the wound with soap and water and put on a dressing. Get the patient to a doctor. Do not shoot the dog. The animal can then be watched for rabies. This is very important.

6. *Insect Bites and Stings*

Insect bites such as flea bites, gnat bites and the like, often cause a swelling. These bites often irritate and can become septic. Dab on a little antiseptic. For bee stings bicarbonate of soda paste or toothpaste helps to ease the pain of the sting; for wasp stings use vinegar.

If the sting is in the mouth or throat give the patient a piece of ice to suck, or put a cloth soaked in cold water on his neck. The most important thing is to remove him immediately to hospital.

7. *Snake Bite*

1. A bite from a poisonous snake is an emergency of the first order. Many snakes in tropical and sub-tropical countries are highly poisonous. The poison is injected through the pair of hollow or deeply grooved biting fangs.

The majority of bites occur on parts of limbs which are exposed—hand, feet and lower legs.

2. If the snake is killed it should be kept for identification.

First Aid

3. All cases of snake bite should be treated as being bitten by poisonous snakes. The method is described below :—

(a) Prevent poison reaching the rest of body by immediate application of a tight cord as a tourniquet above the site of bite. A handkerchief, pyjama cord or a piece of string will do. The sites of application are important :—

- (i) For bites of hand and forearm, apply above elbow.
- (ii) For bites of foot and lower leg, apply above knee. Tight bandage or cord applied below knee and below elbow will not be effective.

(b) Quickly wash bitten area with water or wipe away venom on surface if no water is available.

(c) Use a razor blade or sharp pen knife and make several deep cuts in the shape of a cross through fangmarks each cut being ½-1 inch long and ¼ inch deep. Let the wound bleed freely

so that venom is washed away. Put a small dressing, just to cover the wound.

(d) Evacuate the patient quickly to the nearest Medical Officer so that anti-venom can be given.

(e) Do not remove tourniquet. If after half an hour no Medical Officer is available, loosen the tourniquet for a minute so that the wound bleeds but it is still tight enough to impede the return of blood, tighten it again.

(f) If the bite is on the parts where tourniquet is not possible such as face, chest or abdomen then incise freely and evacuate as early as possible.

(g) Do not let the patient run or walk after a snake bite, as this encourages the circulation of the poison to the rest of the body.

(h) Do not become panicky, reassure patient.

PART II

CHAPTER XIII

DISPOSAL AND TRANSPORT OF CASUALTIES

1. Before dealing with the problem of the disposal and transport of casualties a reference must be made to the type of casualties who may and who will require transport. These types may be divided into lightly injured casualties and seriously injured casualties.

Lightly injured casualties

2. All lightly injured casualties should, after necessary first aid treatment, be directed or sent to the nearest mobile first aid unit or static first aid post, but occasions will arise when a decision as to whether they can safely be sent on foot or should go in a vehicle may be difficult. Some casualties after first aid treatment profess themselves as fit to go home direct and wish to do so. This should be discouraged as far as possible, as unless they attend at a mobile first aid unit or static first aid post, no record of their injury will be kept. At mobile first aid units and static first aid posts anti-tetanic serum is given,

and this is essential for all injuries in which the skin has been broken.

3. The following examples of some types of lightly injured casualties who should not be allowed to walk may be of assistance to first aid workers.

(i) If there is a marked degree of shock, which may be out of all proportion to the injury received.

(ii) If there is the slightest doubt as to whether there is an internal injury or not; cases of multiple small injuries, although apparently superficial, may have caused some internal injury.

(iii) Casualties who have bled from an artery, even in a small wound.

(iv) Casualties with head wounds, even though the wounds may appear slight.

(v) Casualties with an injury to a lower limb, unless it is only a slight flesh wound.

(vi) All cases of poisoning by a nerve or lung irritant gas must on no account be allowed to walk but must be sent at once to a hospital as stretcher cases.

Seriously injured casualties

4. Seriously injured casualties are those who are likely to require in-patient hospital treatment.

They must not be allowed to walk but should be sent by ambulance to hospital after necessary first aid treatment. An exception must be made of persons too severely injured to stand a long journey to the hospital until they have received attention from a doctor at a nearby mobile first aid unit, otherwise, if the hospital is near, they must be taken there.

5. A few examples of cases requiring hospital treatment are :

(i) All cases of internal haemorrhage; open wounds of the chest (pneumothorax); shattered limbs; grossly lacerated and crushed limbs; wounds of belly; open-complicated fractures; fractures of the skull, spine, pelvis and thigh; injuries involving the eye; injuries involving the lower jaw and control of the tongue.

(ii) Cases of severe external haemmorrhage and of multiple or extensive burns.

(iii) Cases in which further shock is likely to supervene, as in persons trapped for long periods under debris, or exposed to cold and wet; in fact, all but those with trivial injuries and those who are merely shaken, frightened or faint. It must not be forgotten that very small external wounds may be associated with severe damage beneath the surface.

(iv) All diabetic patients who may be injured or who are suddenly taken ill.

Method of transport for casualties

6. The following methods of transport are used for casualties who should not be allowed to walk or who are unable to do so.

(i) Stretcher—when these are available and can be used.

(ii) By improvised means when stretchers are not available.

Training in the use of stretchers

7. Placing of casualties on stretchers, their removal and loading into ambulances should be in accordance with methods which experience has shown to be the most comfortable for the patients.

8. It is essential that stretcher bearers should receive some training in the form of drill for correct carriage and practice in loading, unloading and handling stretchers, but it is not considered necessary to formulate any new form of such drill. Any form of drill must of necessity be modified to meet war conditions and cannot be too rigidly followed. The result of an efficient training, however, will be to promote and maintain concerted action and good team work among the rescue personnel and other first aid workers.

The following simple exercises provide a basis for what is required.

(i) Four men of approximately the same height are allotted to carry each stretcher. They are called "bearers" and are numbered 1, 2, 3 and 4, four men constituting a stretcher squad. The No. 1 bearer of each squad is the leader and gives all orders.

(ii) The positions which these bearers take up in relation to a stretcher are :

No. 1, on the right of the stretcher with his toes in line with the front end of the right pole.

No. 2, on the left of the stretcher in line with No. 1.

No. 3, on the right of the stretcher behind No. 1, with his heels in line with the rear end of the right pole.

No. 4, on the left of the stretcher in line with No. 3.

These positions are permanent.

Loading Stretchers

9. On the command "lift stretcher—collect wounded" all four bearers stoop together and lift the stretcher from the ground with the hand

nearest to the stretcher. They then go by the shortest route to the casualty and, halting three places from and in line with his head, place the stretcher on the ground and stand up to await the next order.

10. On the command "load stretcher" No. 1 bearer goes to the right of the casualty at his hips, Nos. 2, 3 and 4 to the left of the casualty at his knees, hips and shoulders respectively. All bearers now turn inwards together, kneel on the left knee and pass their hands, palms upwards, beneath the body of the casualty. No. 2 bearer supporting the legs, Nos. 1 and 3 (by joining hands) the thighs and hips and No. 4 the shoulders and head. At a given signal the casualty is lifted gently off the ground on to the knees of Nos. 2, 3 and 4 bearers, while No. 1 disengages and brings the stretcher which he places in front of the bearers ready for the casualty to be lowered on to it. He then takes up his former position and again links hands with No. 3. On the command "lower", the casualty is lowered gently on to the centre of the stretcher. The bearers then disengage and wrap the casualty in the folds of the blankets previously laid upon the stretcher, before rising and resuming their original position at the poles of the stretcher. (*See* figs. 13 & 14)

11. On the command "prepare to lift" each bearer stoops with bended knees and back erect and grasps the pole of the stretcher immediately

Fig. 13—Patient being lifted.

Fig. 14—Lifting the stretcher.

in front of him. On the command "lift stretcher" the stretcher is raised until the bearer is standing upright but with arms extending downwards and the stretcher in a horizontal position.

12. At a given word of command the bearers step off together with the inner foot, *i.e.*, that nearest the stretcher. The party is thus out of step and this prevents the stretcher from swinging. If only two men carry the stretcher the front man steps off with the left foot, the rear man with the right.

13. As a rule it does not matter whether a casualty is carried head first or feet first, but when going uphill it is more comfortable for him to be carried head first unless there is some reason to the contrary.

Loading a stretcher with only two bearers

14. The stretcher is again placed in line with the casualty. After giving first aid the two bearers stand astride the casualty facing the stretcher. The casualty's arms are folded across his chest if he is unconscious but, if not, he may be able to help by grasping the leading bearer round the neck with one or both hands as he bends down. The bearers both bend together, lift the casualty by the shoulders and thighs, and shuffle forwards stradding the stretcher as they reach it. (fig. 15).

Carrying Stretchers

15. A stretcher should always be carried as nearly level as possible. On slopes, the injured extremity should be kept at a higher level, *e.g.*, a casualty with head injuries should be carried

head first upstairs; one with a fracture of wound of the lower limbs head first downstairs.

Fig. 15—Lifting the patient on to a stretcher by two bearers.

Position of the casualty on the stretcher

16. The position of the casualty on the stretcher depends on the situation of the wound, but will usually be on the back. The following types of wounds or injury require a special position :

(i) In head injuries care must be taken that the injured part does not press against the stretcher. Casualties with severe injuries to the mouth and lower part of the face may need to be carried face downward with the head hanging

over the end of the stretcher in order to prevent the tongue falling back and causing choking. The forehead can be supported by a broad bandage tied between the two poles. (fig. 16).

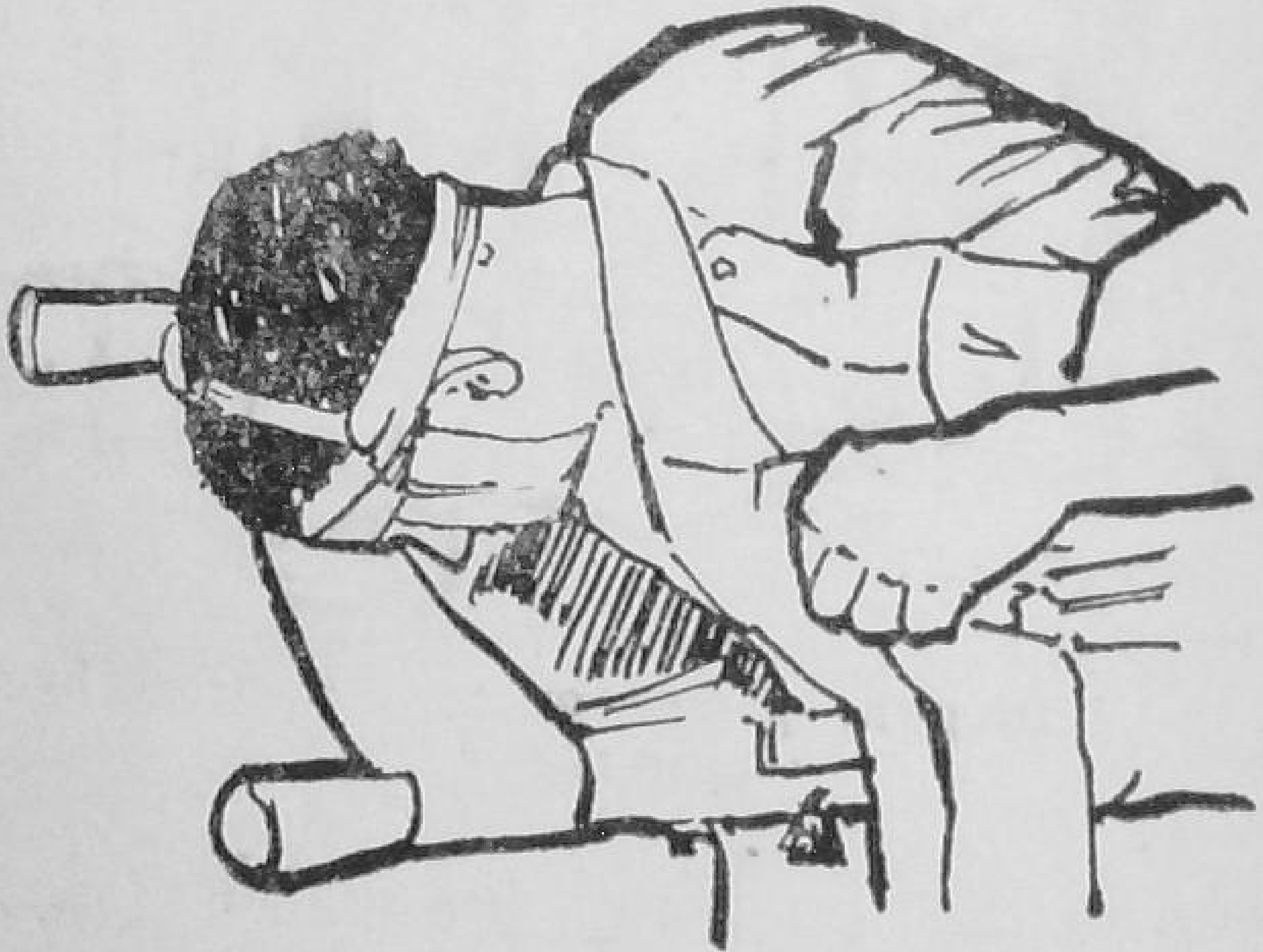


Fig. 16—Support of head in head and facial injuries.

(ii) For injuries to the lower limbs, the casualty should be laid on his back inclining toward the injured side. This position is less liable than others to cause motion of the injured limb during transport. A casualty which is in splints should, however, be placed

on its back and not inclined to the injured side.

(iii) For injuries to the upper limbs, if the patient is unable to walk he should be placed on his back or on the uninjured side; in this position there is less liability of displacement of a broken bone.

(iv) A casualty suffering from chest injuries should be placed with his chest well raised, his body being inclined towards the injured side. This tends to relieve any difficulty in breathing.

(v) Abdominal cases should be placed on the back, the abdominal wall relaxed by flexing the knees over a box, haversack or rolled coat and the head and shoulders raised. No attempt must be made to replace protruding organs.

(vi) In a fracture of the spinal column (back) the casualty should be placed on the stretcher in the prone position. (also *See* Chapter VI, para 15).

Improvisation of Stretchers

17. When the normal pattern stretchers are not available, by using a little ingenuity stretchers can usually be improvised from materials which are readily available in the houses. For example,

stretcher poles can be improvised from charpoy sides, bamboos, broom handles, rifles and so on. The support can be improvised from blankets, ground sheets, overcoats, empty sacks, tarpaulins, pagrees, ropes, split bamboos and so on.

18. This chapter will deal with a few of the common methods in use. It is emphasised that before loading a patient on to the improvised stretcher, it should first be tested by a man equal in weight or heavier than the patient. During carriage the stretcher should be frequently examined to ensure that it is still secure.

19. *With one blanket and two poles*

(a) Spread the blanket on the ground.

(b) Place two poles lengthwise on the blanket, so that they divide it into three equal parts.

(c) Fold the right side of the blanket over and tuck it under the left pole. Fold the left side of the blanket over and tuck it under the right pole.

(d) Fold both free ends of the blankets over two or three times, in the same way as rolling up a shirt sleeve.

(e) Tie on cross bars between the poles at both ends (fig. 17).

(f) Test the stretcher.

(g) Carry the patient a short distance.

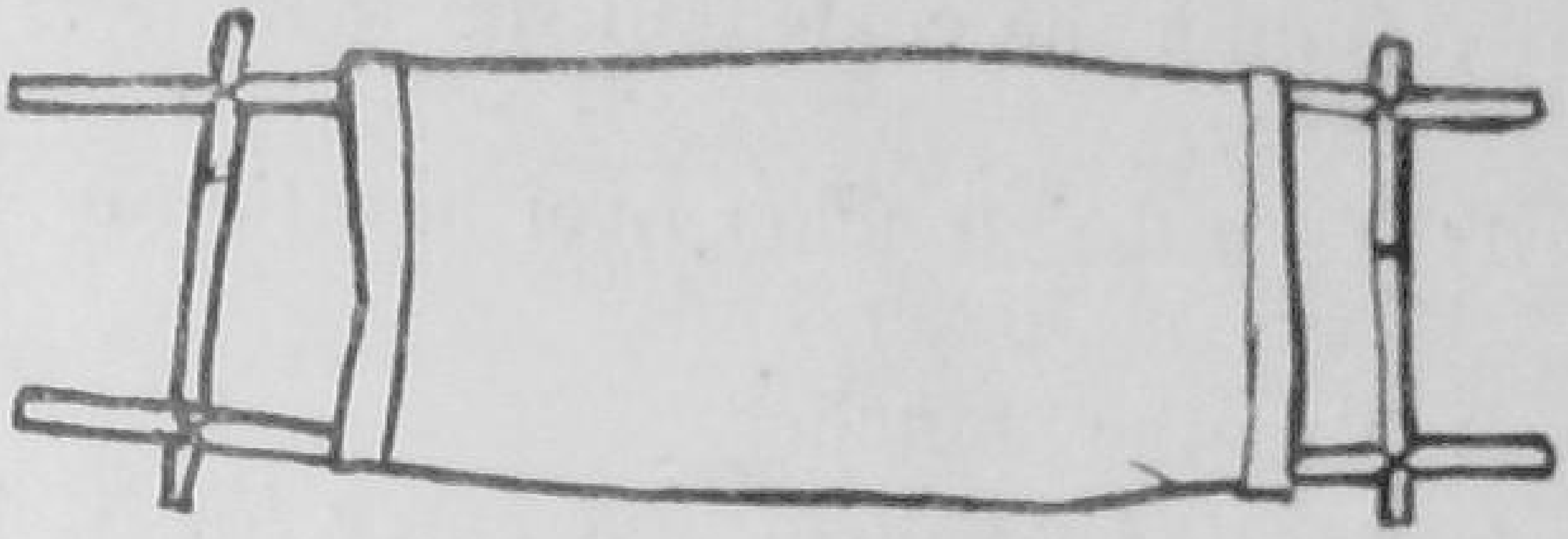


Fig. 17—Improvised stretcher with two poles and one blanket.

20. *With two overcoats and two poles.*

(a) Turn the sleeves of the overcoats inside out, and lay the overcoats in line on the ground, tails together and slightly over-lapping, with the outer sides touching the ground.

(b) Pass the poles through the sleeves on both sides. (fig. 18).

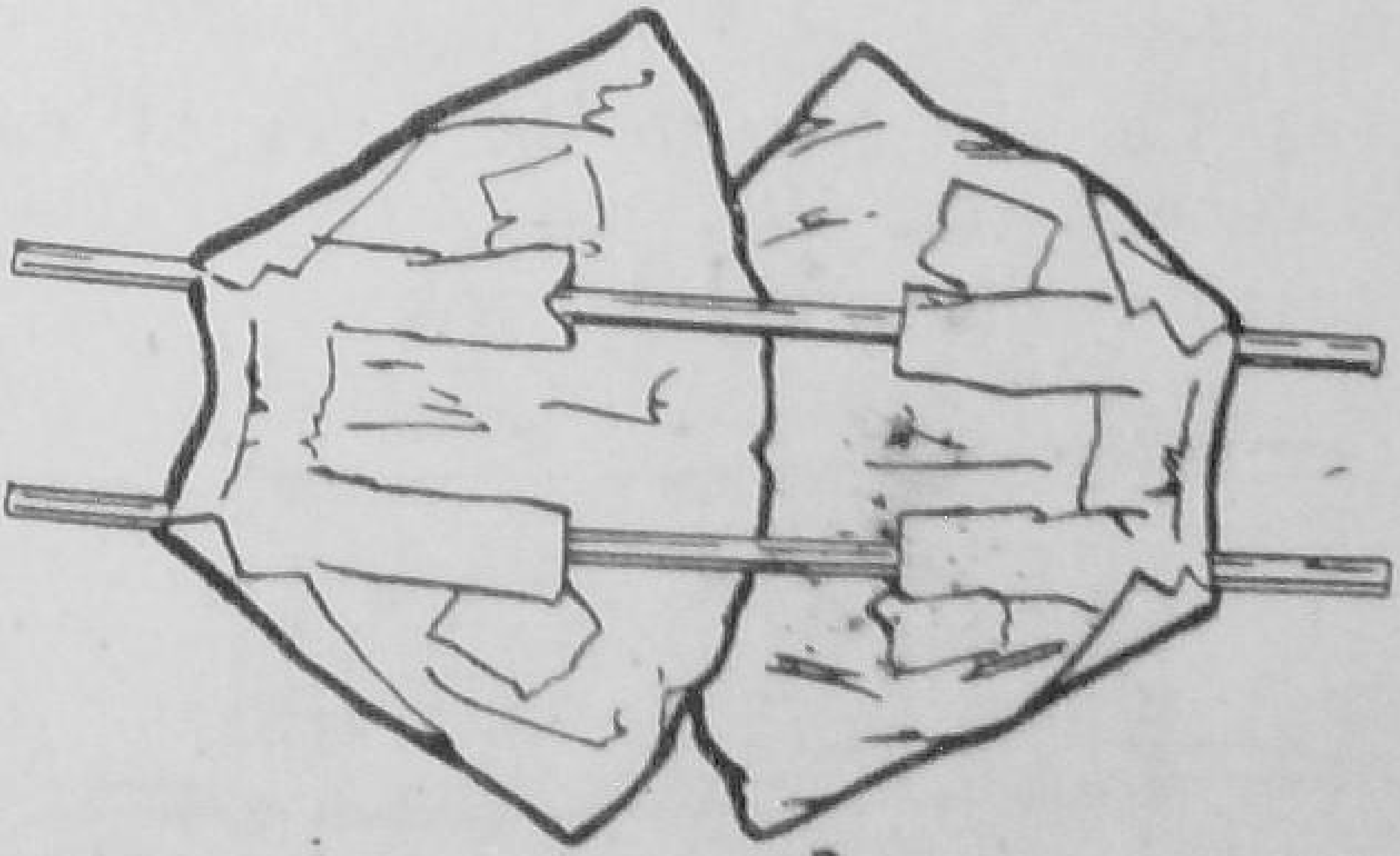


Fig. 18—Improvised stretcher showing two poles passed through turned out sleeves of two overcoats.

(c) Button the coats and the belts over the poles.
(d) Turn the stretcher over and tie on cross bars at either ends.
(e) Test the stretcher.
(f) Load the patient and carry for a short distance.

21. *With two empty sacks and two poles*

(a) Take two empty sacks, and cut holes in the bottom corners.
(b) Lay the bags lengthwise on the ground, open ends together, with the mouth of one bag projecting slightly into the mouth of the other.
(c) Pass the poles through the holes in the bags.
(d) Tie cross bars to the poles at either ends. (fig. 19).
(e) Test the stretcher.

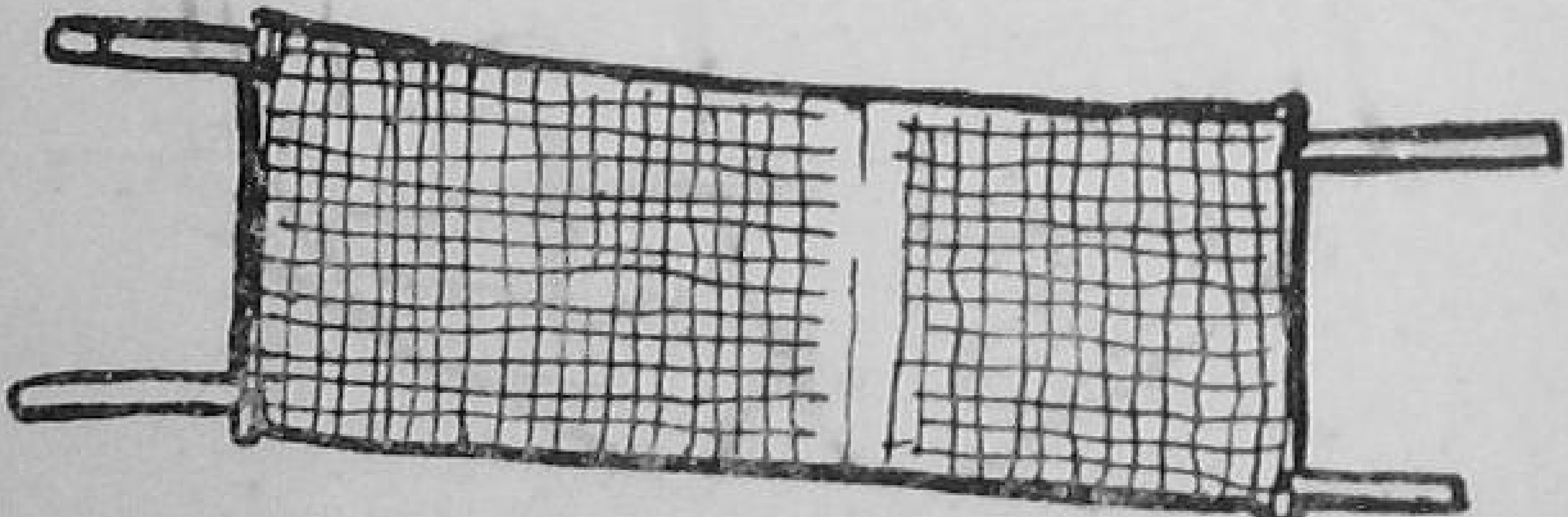


Fig. 19—Stretcher improvised with two poles and two socks/gunny bags.

(f) Load the patient and carry for a short distance.

22. *With pagrees or rope and two poles*

(a) Take two poles and tie on cross bars at either ends.

(b) Wind one or two pagrees or rope over the two poles so as to form a lattice in the space between the cross bars. (fig. 20).

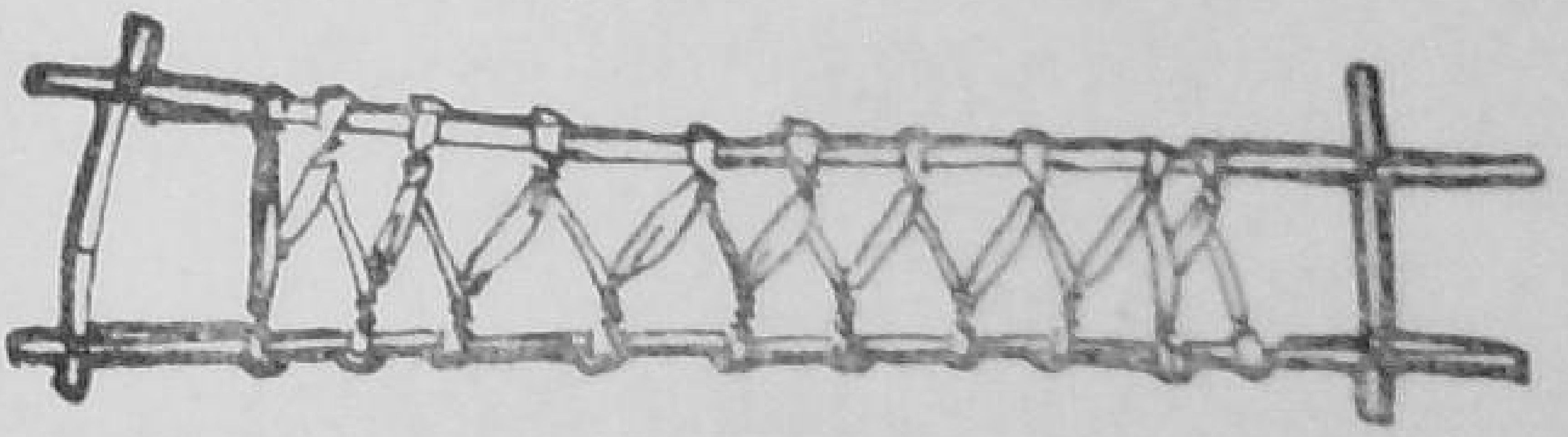


Fig. 20—Stretcher improvised with pagree or ropes.

(c) Test the stretcher.

(d) Load the patient and carry him for a short distance.

23. *With split bamboo pieces and two poles*

(a) Take two poles and lay them on the ground about two feet apart.

(b) Tie on a series of cross bars made from equal lengths of split bamboo, or similar material. (fig. 21).

(c) Test the stretcher.

(d) Load the patient and carry him for a short distance.

L2CHEB/62—4

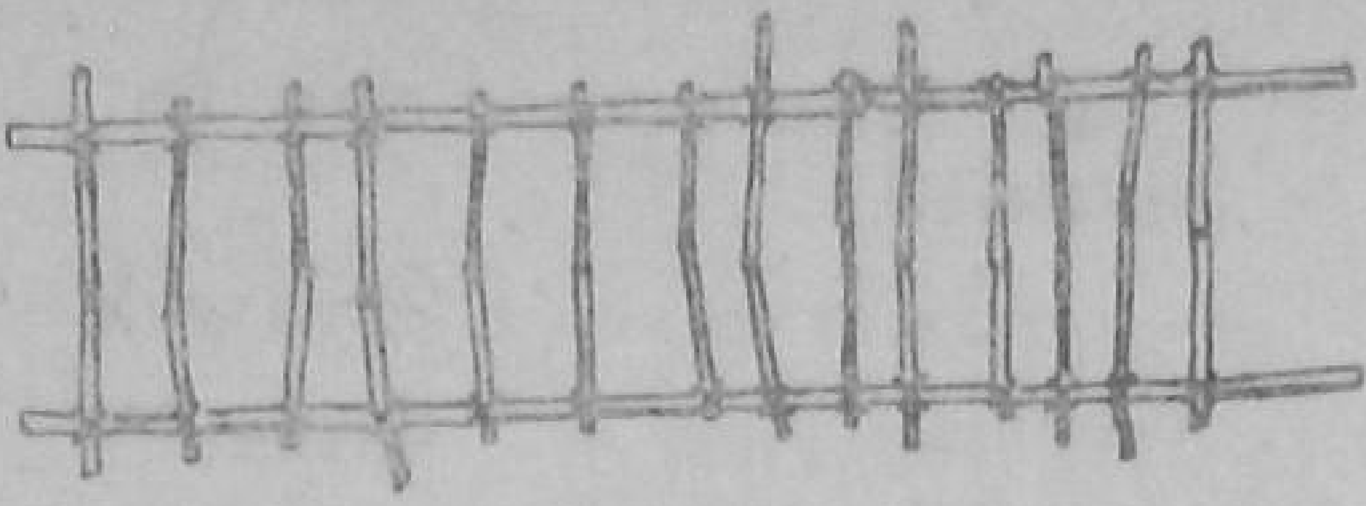


Fig. 21—Stretcher improvised with split bamboo pieces and two poles.

Transport of Casualties when Stretchers are not available or cannot be used

24. If no stretcher is available or it is impossible to use a stretcher, casualties can be carried by various types of hand carriage.

Method of Hand Carriage suitable for one Bearer

Pick-a-back

25. Carry the casualty in the ordinary pick-a-back position. This is the best way if he is conscious and able to hold on.

Human Crutch

26. Where the casualty can help himself the rescuer stands at his injured side and places the casualty's arm round his shoulder grasping the wrist with his hand. At the same time he passes his other hand round the casualty's waist gripping his clothing at the hip, and thus assists him by acting as a crutch. (figi 22).

Fig. 22—Human crutch.

Fireman's lift

27. This is one way of carrying a helpless or unconscious casualty and allows the bearer a free hand. It is easier for the bearer than pick-a-back, but not so comfortable for the casualty. Various stages of the lift are shown in Fig. 23A—D.

If the casualty is lying on his back, kneel on one knee (usually the right) at his head, place

your right hand upon his right shoulder, anu with your left hand beneath his left shoulder turn him over gently on to his face so that his forehead and face are supported on your right forearm. Place your hands beneath the casualty's shoulders and lift him up to a kneeling position, supporting him against your body with his head on your right shoulder. (Fig. 23A).

Fig. 23A—Fireman's Lift.

Fig. 23B—Fireman's Lift.

Fig. 23C—Fireman's Lift.

Fig. 23D—Fireman's Lift.

With your hands in the casualty's armpits stand up and lift him on to his feet, pressing his body close to yours; shift your hands from his armpits and clasp them together round his waist. (fig. 23B).

Keep your right arm round the casualty's waist and grasp his right wrist with your left hand

carrying the limb away from the body. Stoop and place your head beneath his right arm and hoist him up on to your right shoulder, still retaining hold of his right wrist with your left hand. Pass your right arm between the casualty's thighs, or round both thighs if it be a woman, and grip his right wrist with your right hand at the same time removing your left hand which becomes free. (fig. 23C).

Shift the weight of the casualty well on to the centre of your back and rise to the erect position. (fig. 23D).

Rescue Crawl

28. If a rescuer finds an unconscious casualty, or one who is unable to help himself, or who is too heavy for one of the above three methods to be applied, the rescue crawl can be used as follows :

Turn the casualty on to his back and tie his wrists together. Kneel astride him facing his head and place your head through the loop thus formed by his arms. By crawling on your hands and knees you can then drag him with you, even though he may be heavier than you are. (fig. 24).

It may be necessary to support the casualty's head with one hand, or by placing a triangular bandage under the casualty's head and round your neck, or by some other convenient method.

Fig. 24—Rescue crawl.

Removal Downstairs

29. To move the casualty downstairs, lay him on his back, head downwards on the stairs, place your hands under his armpits so that his head rests on the crook of your arm and ease him gently downstairs. (fig. 25).

Method of Hand Carriage Suitable for more than one Bearer

Human Crutch by two Bearers

30. Where two bearers are available they take up their positions, one on each side of the casualty. They place the casualty's arms round their shoulders and grasp his wrists with their outside hands. They pass their arms round the casualty's waist, grasping his clothing at the hip, and thus assist him by acting as crutches. This method can be used for an unconscious casualty.

Fig. 25—Removal downstairs.

The fore and aft method

31. The casualty is placed on his back. One bearer raises the shoulders and passes his hands under the arms from behind clasping them in front of the chest. The other bearer takes one leg under each arm and they carry him feet first. If a leg is broken, both legs should be tied

together, or put in splints and both carried under one arm.

An alternative method of fore and aft carriage is as follows:

The casualty is placed on his back. One bearer raises the shoulders and passes his hands beneath the armpits to grasp the flexed forearms of the casualty. The other bearer passes one

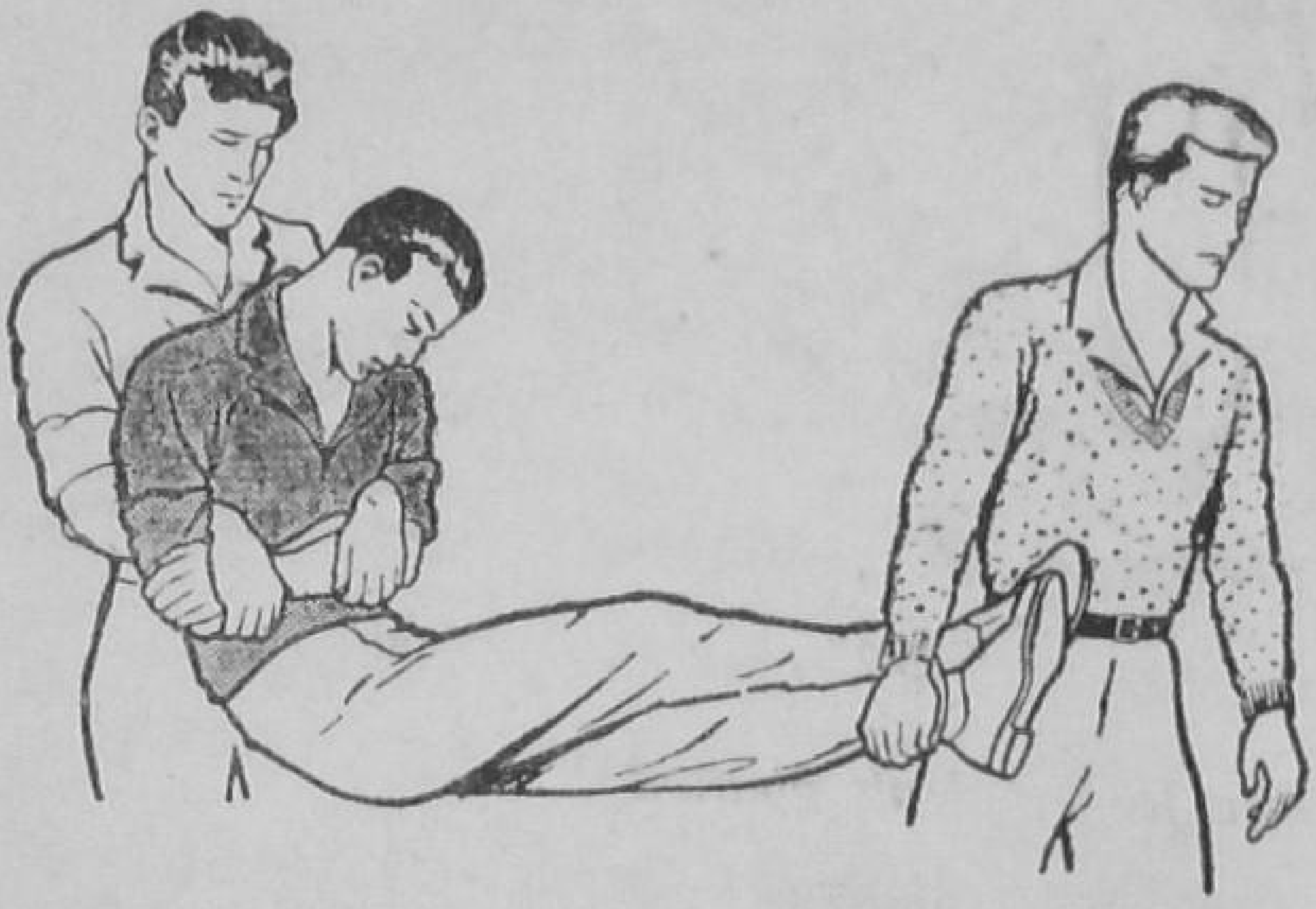


Fig. 26—The fore and aft method of hand carriage.

arm around both legs of the casualty and walks forward, keeping one arm free. (fig. 26).

Two handed seat

32. Two bearers face one another on either side of the casualty and stoop. Each bearer passes his arm nearest the casualty's head under his back just below the shoulders and, if possible, grips his clothing. They raise the casualty's back and slip their other arms under the middle of his thighs, clasping their heads with a hook grip. (figs. 27 A—D). The bearers rise together and step off with short paces (broken step).

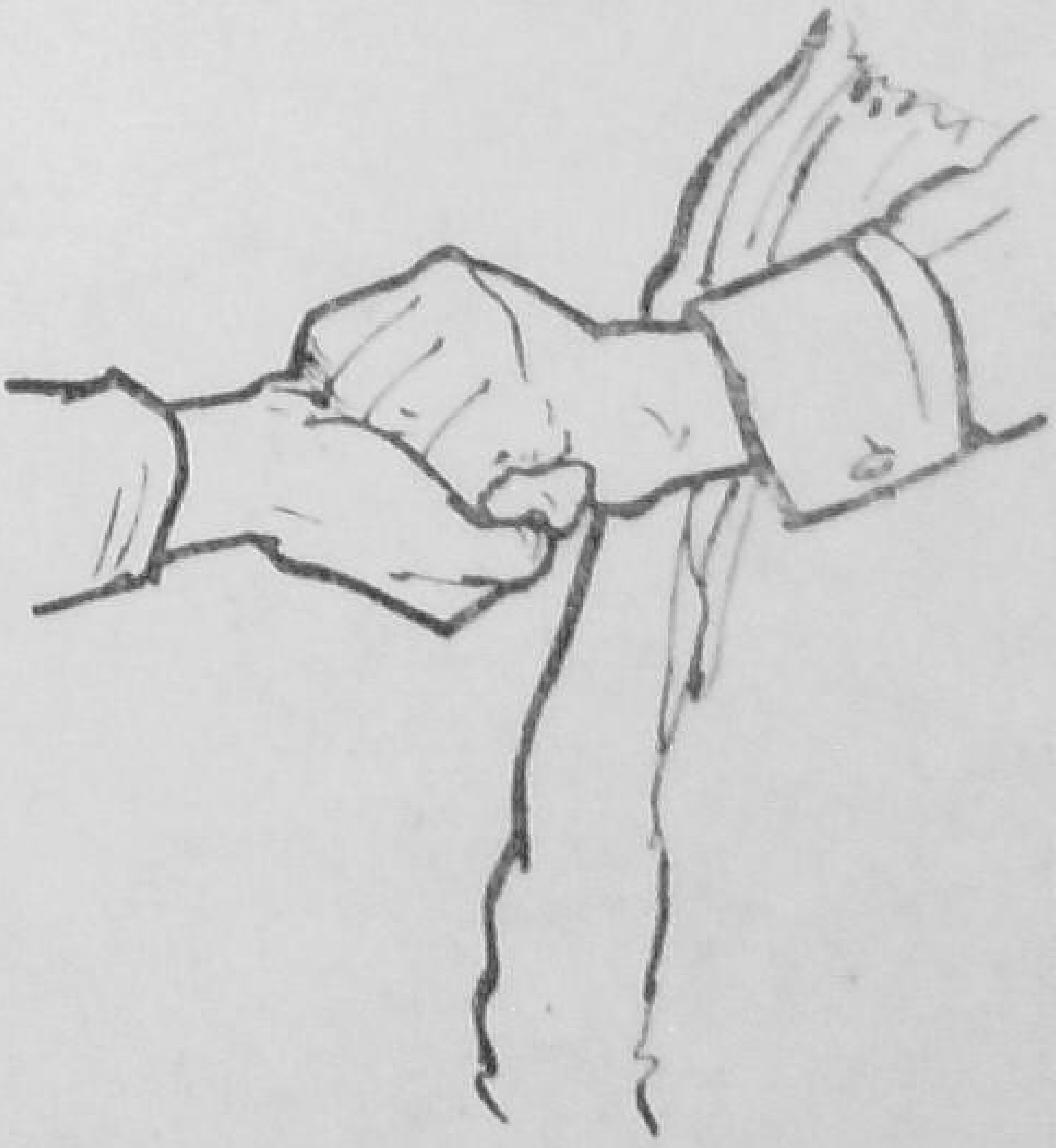


Fig. 27A—A hooked grip.

Fig. 27B—Gripping the clothing.

Fig. 27C—Carriage of a patient by two handed seat (back view).

Fig. 27D—Carrying of a patient by two handed grip (front view)

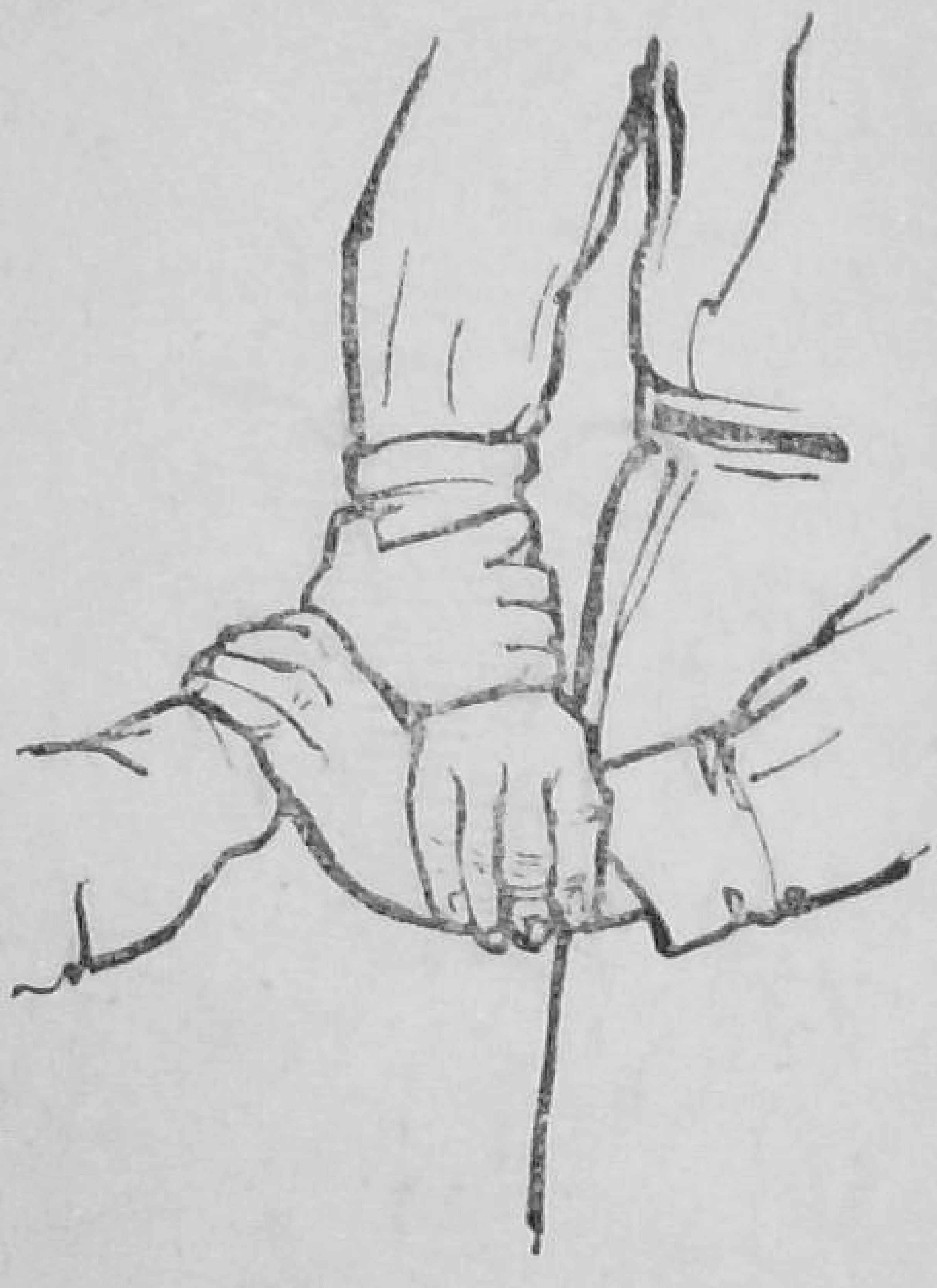


Fig. 28A—Three handed grip.

Three handed seat

The two bearers (Nos. 1 and 2) face each other on either side of the casualty and stoop. No. 1 grasps his own left wrist with his right hand. No. 2 grasps No. 1's right wrist with his right hand, and No. 1 then grasps No. 2's right wrist with his left hand. (See fig. 28A). No. 2 reaches across within his left arm and grasps No. 1's right arm just below the shoulder.

Fig. 28B—Carriage by three handed grip.

The casualty is seated on the hand seat and places his arms round the bearers' neck. The bearers rise together and step off with short paces (broken step). This method can be used for an unconscious casualty, the bearers having to place the casualty's arms round their necks. (fig. 28B).

Fig. 29A—Four handed grip.

Four handed seat

33. The bearers face each other and each grasps his own left wrist with his right hand. Their hands are then put together, the free left hand grasping the right wrist of the man opposite. The casualty puts one arm or both arms round the necks of the bearers. The bearers should rise together and step off with short paces (broken step). (fig. 29A):

Fig. 29B—Carrying by four handed seat.

Clothes lift

34. The clothes lift should always be used in preference to lifting a casualty by his limbs. Taking up convenient positions beside the

casualty, the bearers stoop and take firm hold of his clothing in such a way that the weight of the casualty is evenly distributed between the bearers when lifted.

Chapter XIV

BLANKETING A STRETCHER; BLANKETING A BADLY INJURED CASUALTY; BLANKET LIFTS

Blanketing a Stretcher

1. Before a casualty is laid upon a stretcher it should be covered with a blanket or some other cover so that he does not lie directly upon the canvas. This adds to his comfort and reduces shock. Remember that it is more important to put blankets under him than over him.

With one blanket

2. This can be used in the following manner (figs. 30 A & B):

(i) Place blanket diagonally over the stretcher.

(ii) Wrap from side to side and tuck in.

(iii) Wrap head and feet.

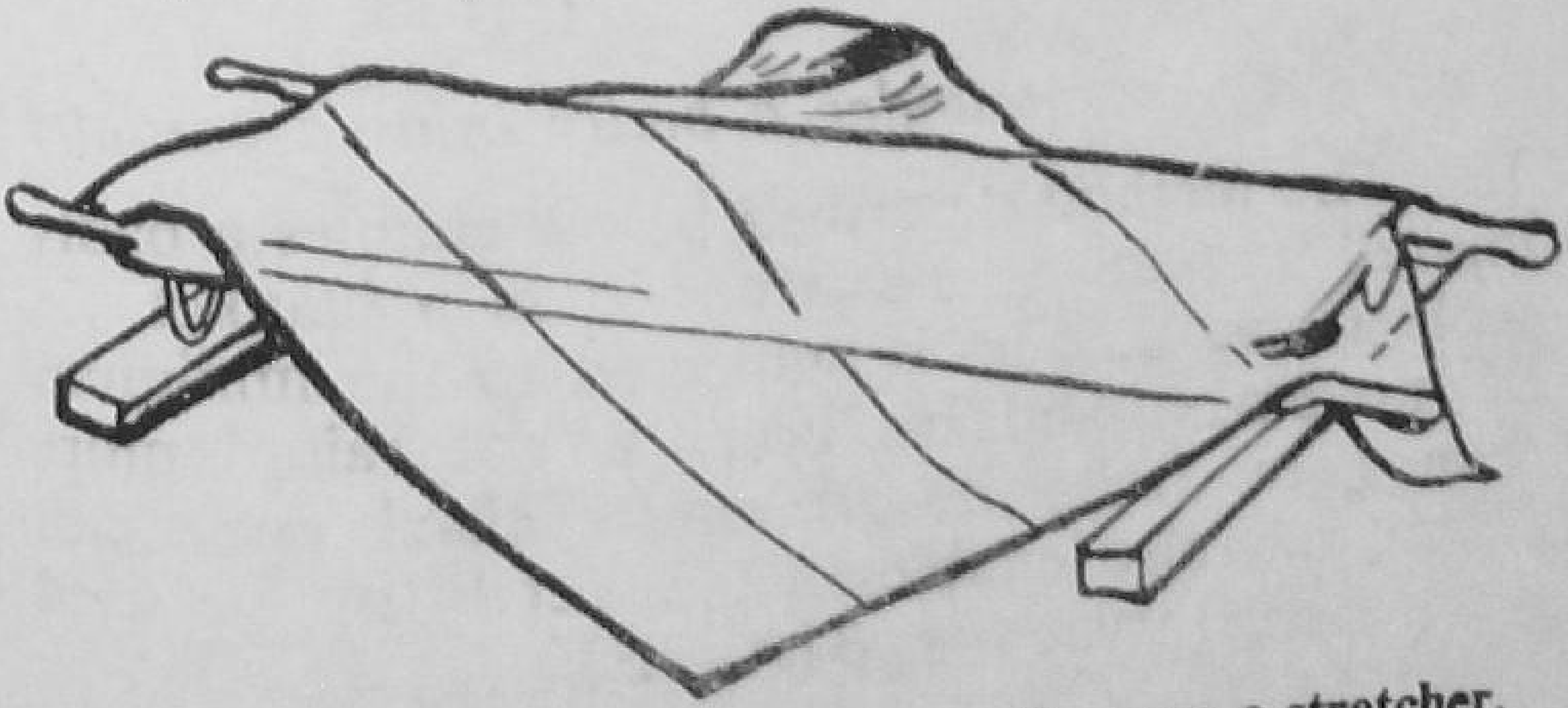


Fig. 30A—Blanket is placed diagonally over a stretcher.

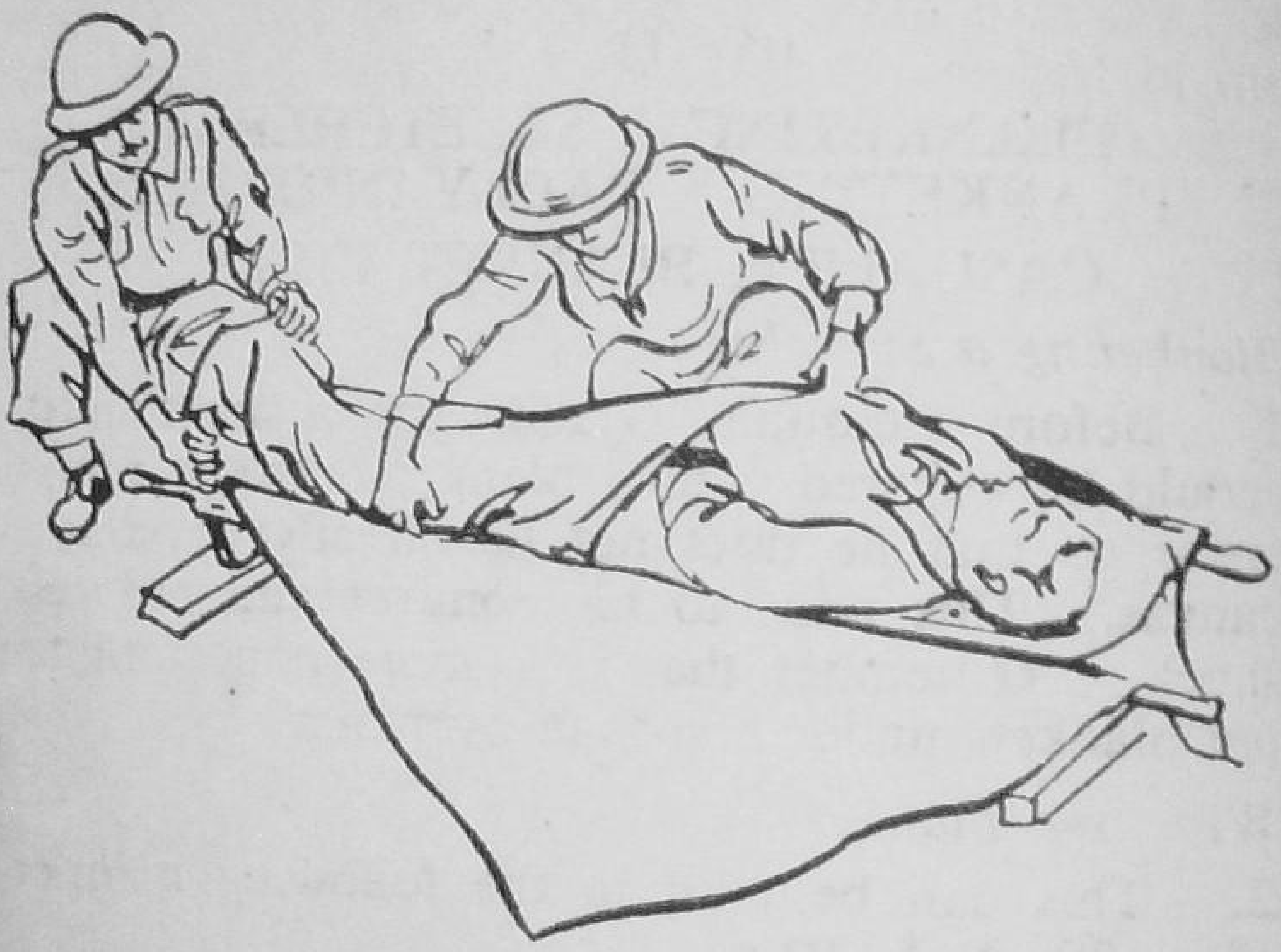


Fig. 30B—Tucking in patient with one blanket.

Placing a blanket under a badly injured casualty

3. The method described below enables a badly injured casualty to be wrapped in a blanket, in such a way that he is subjected to the minimum of movement and his body is not raised more than 1 in. from the ground. This keeps him warm and also enables a blanket lift to be used when necessary. (figs. 31A—E).

When the casualty is lying on his back

4. (i) A blanket is laid flat on the ground lengthwise beside the casualty, with the blanket hems towards the head and feet.

(ii) Two attendants, one on each edge of the blanket, facing the same hem, pick up the blanket with both hands at a point 18 ins. from the hem, their outer hands being at the edge and their inner hands some 12 ins. from the edge.

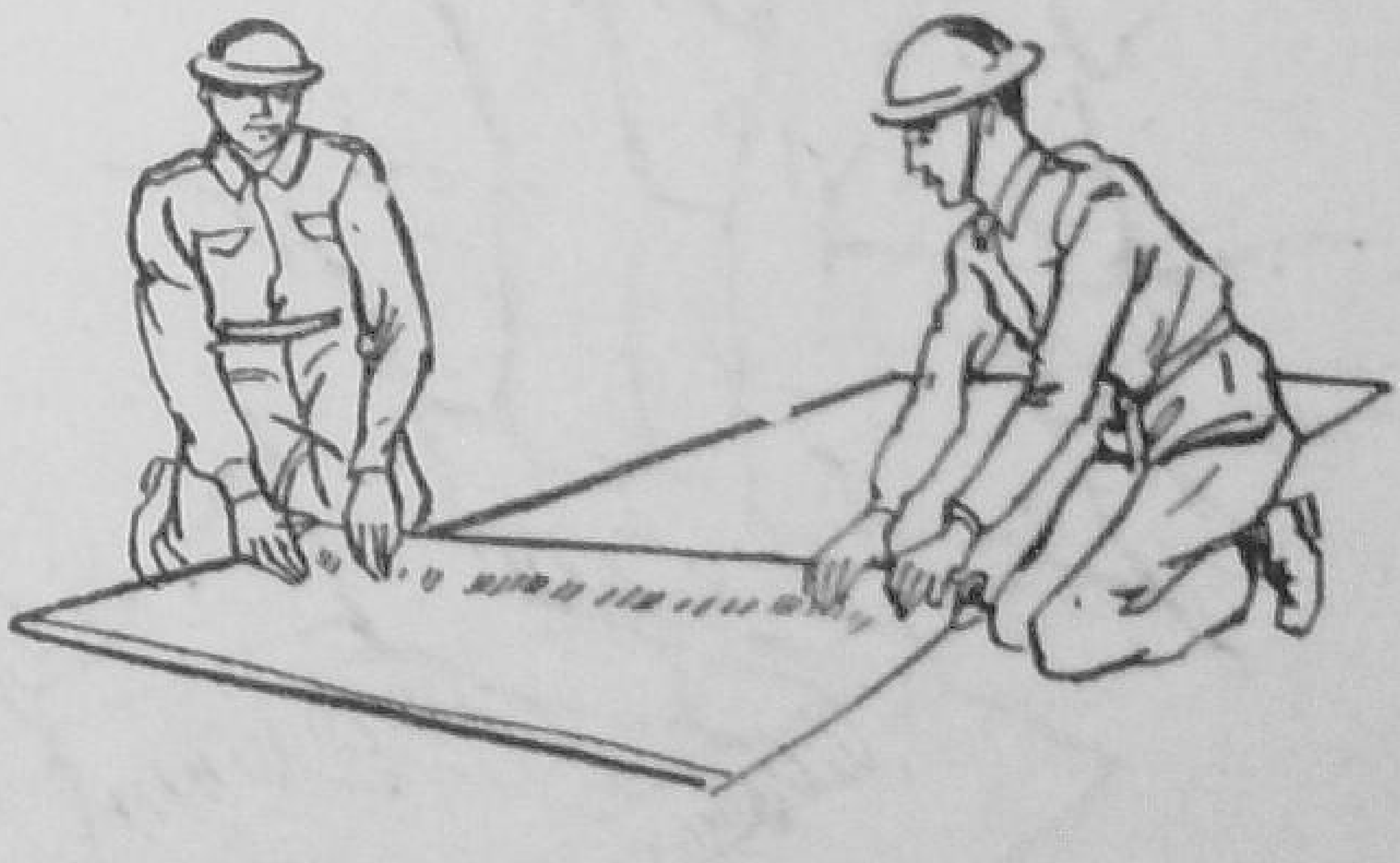


Fig. 31—Method of placing blanket under casualty when casualty is lying on its back.

A—How to role the blanket ?

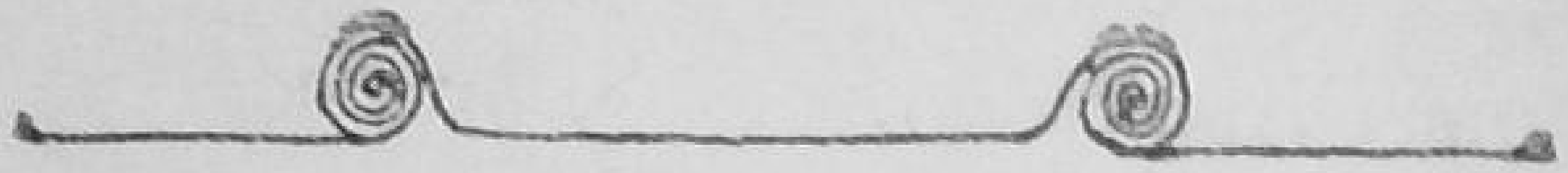


Fig. 31 B—Shows rolled up blanket.

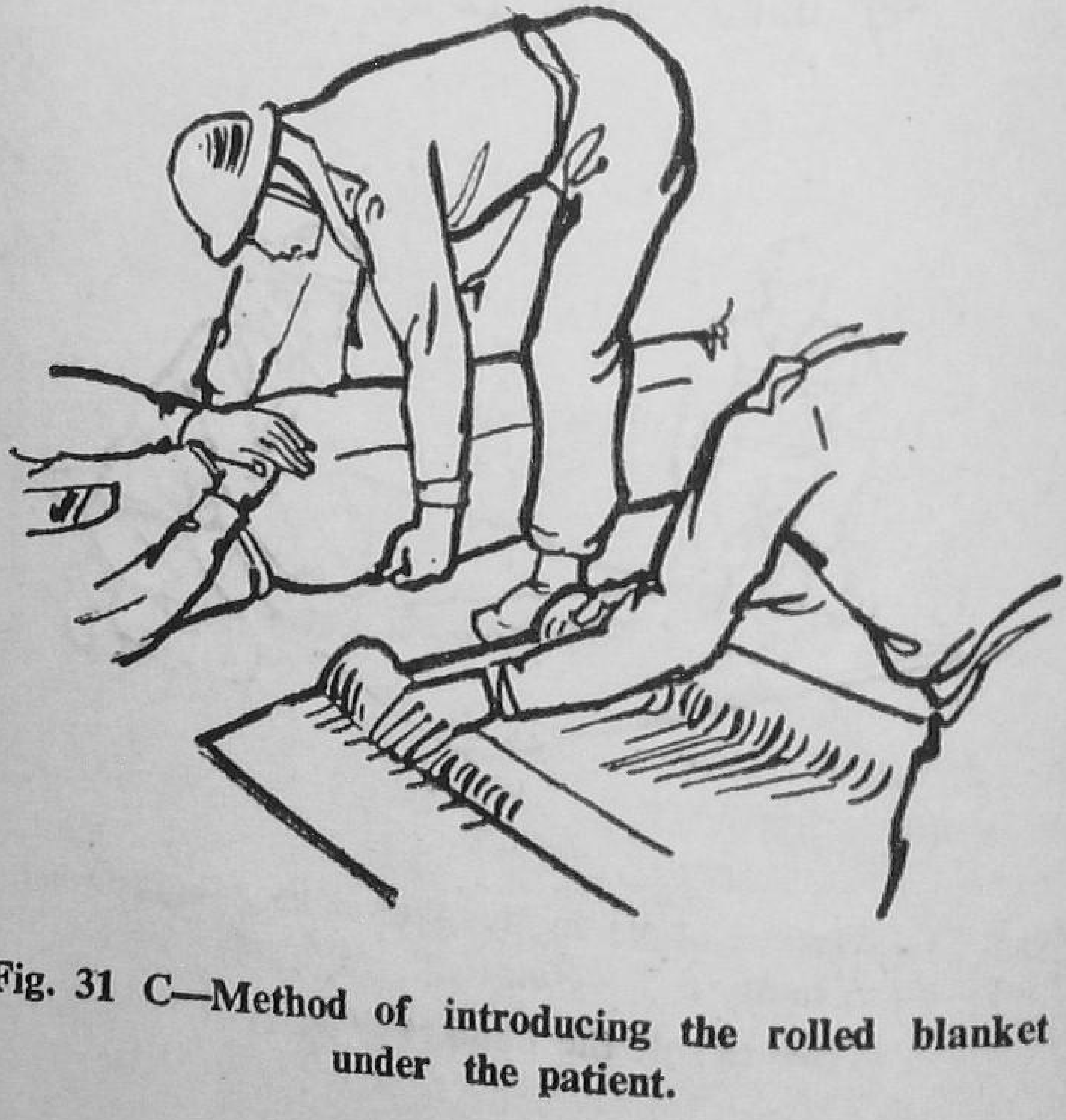


Fig. 31 C—Method of introducing the rolled blanket under the patient.

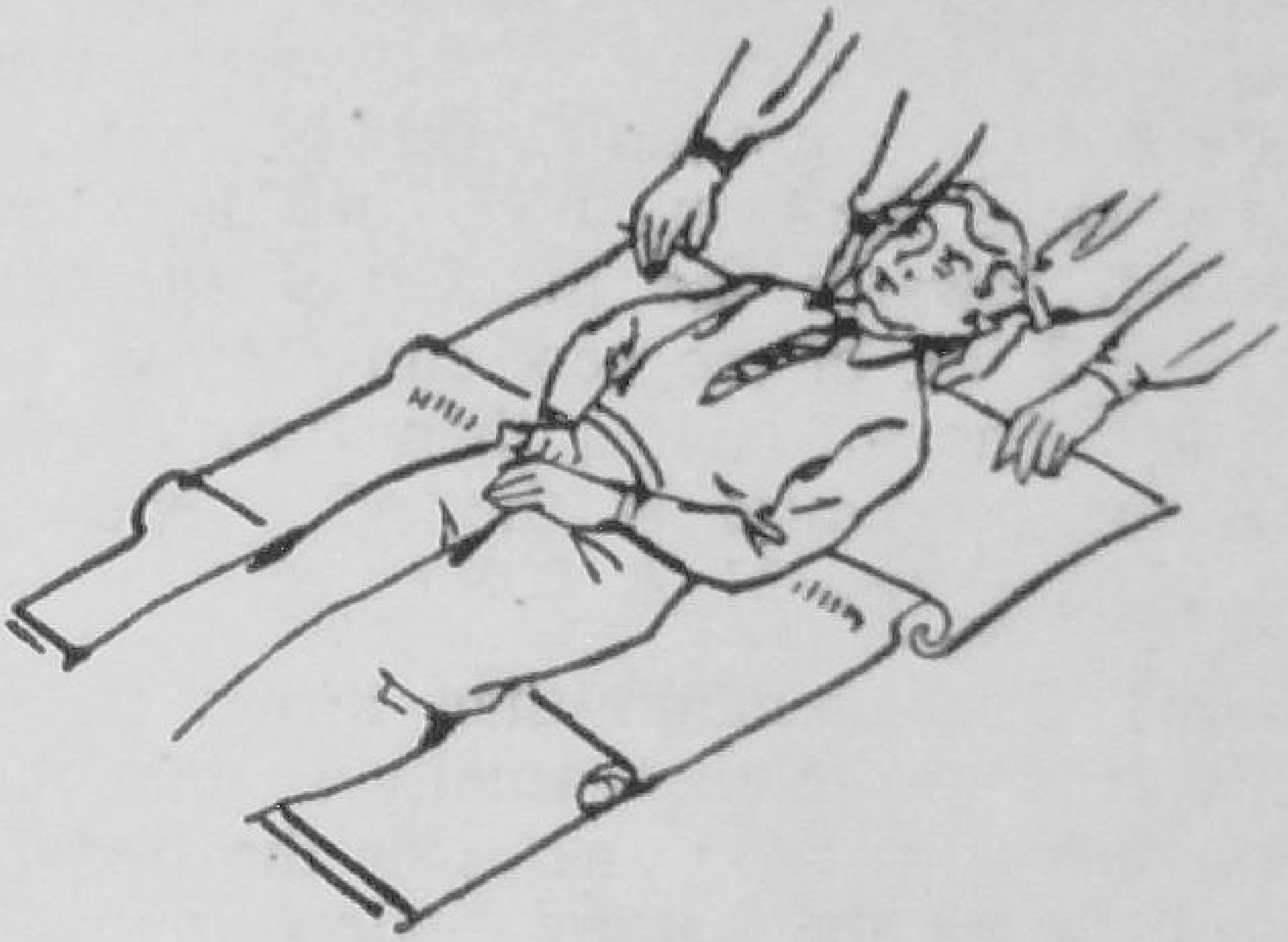


Fig. 31D—Unrolling the folds and straightening out the blanket.

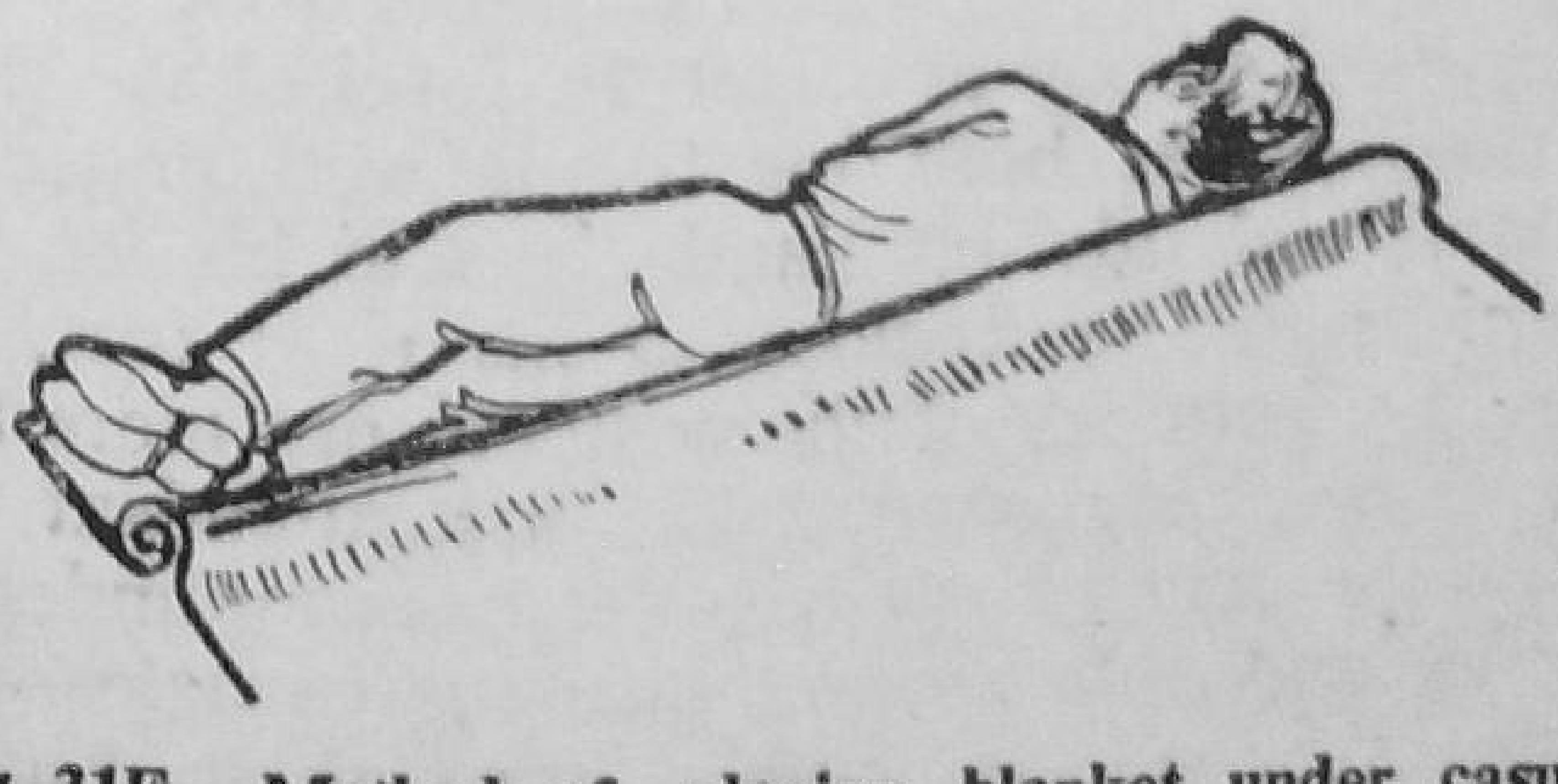


Fig. 31E. Method of placing blanket under casualty when casualty is lying on the side.

They then with both pairs of hands make a fold across the width of the blanket by lifting it slightly from the ground. The blanket is then rolled towards the hem, both attendants moving backwards towards the middle of the blanket, until only 2 ins. of the hem end remains outside the roll. The attendants then turn round and repeat the procedure at the other end of the blanket. (*See* figs. 31 A & B).

(iii) One attendant then brings the rolled up blanket close to the casualty so that the line of the rolls is at right angles to the body, with one roll facing the natural hollow in the small of the back and the other roll facing the natural hollow below the buttocks. (*See* fig. 31C). Having done this, he kneels at the side of the casualty holding one roll of the blanket in each hand. The other attendant then straddles the casualty, facing his head, with one foot close to thigh below the hip, and the other foot close to the casualty's body at about the level of the waist. He then places both his hands well under the casualty, with his left hand close to his left foot and his right hand close to his right foot, and raises the buttocks of the casualty not more than 1 in. from the ground. The first attendant then pushes the rolls of the blanket halfway under the casualty and going round past the casualty's feet to the other side pulls them through so that the middle of the blanket is under the casualty. The

second attendant then gently lowers the caualty on to the blanket.

(iv) Both attendants then kneel at the casualty's head facing his feet, the attendant on the right kneeling on his left knee and the one on the left on his right knee. Steadying the shoulders of the casualty with their inner hands, they take hold of the hem of the rolled blanket with their outer hands as close as possible to the body and pull the hem towards themselves, the blanket unrolling as they do this until it is quite flat under the casualty's back and puckered under his neck.

(v) The first attendant then lifts and supports the casualty's head with both hands, about one in. from the ground, whilst the second draws the blanket under the head until it is taut. (*See* fig. 31 D)

(vi) This procedure is then repeated with the lower roll, puckering the blanket under the hollow of the ankles, steadying the feet and drawing the blanket taut.

A variation in the technique described in 4(*ii*) *above is as follows :*

5. Two attendants take up their position at the ends of the blanket facing one another. They each pick up the blanket in both hands and pleat it towards the centre in 3 in. pleats concertina fashion, stopping when they reach the natural

hollows in the small of the back and below the buttocks. They then proceed as described in paragraph 4(iii), (iv), (v) and (vi).

6. The advantages claimed for this variation are :

(i) That the distance left between the pleating can be varied according to the size of the patient.

(ii) That the blanket will pass under the patient more readily and, because of its flat nature, the pleating will unfold more easily than roll when the blanket under the patient is drawn towards the head and the heels.

When a casualty is lying on his side

7. (i) A blanket is laid flat on the ground lengthwise beside the casualty, at his back. Each attendant takes hold of a piece of blanket 15 ins. from the edge nearest to the patient and between they make on lengthwise roll in the same way as for the breadthwise roll.

(ii) They then place the roll of the blanket close to the patient's body and gently roll him on to his back. This will expose the edge of the rolled blanket which should be gently drawn out until taut. The casualty is then lying face upwards on the middle of the blanket.

(iii) In the case of a fractured jaw, or other injury which prevents the casualty from

being placed on his back, the lengthwise roll of the blanket should be placed close to the front of his body and he should then be gently rolled over face downwards, when a comfortable blanket lift will be possible.

When the casualty is lying face downwards

8. If his injuries allow, turn the casualty on to one side and proceed accordingly.

Blanket Lift

9. By placing a blanket under the casualty in the way desired above a blanket lift can be used.

Chapter XV

LABELLING OF CASUALTIES AND DISPOSAL OF THE DEAD

Labelling of Casualties

1. Certain types of casualty, as mentioned below, as well as all unconscious casualties and all dead bodies should be labelled before being removed.

2. Tie-on casualty labels, with a symbol written on them, should be used; failing this a piece of paper attached to a button or pinned to the clothing will serve. If possible, the forehead of the casualty should also be marked with indelible pencil with the same symbol.

3. The symbols used for marking casualties and their interpretation are as follows :

Symbol on label and/or forehead	*Interpretation*
X	Requires priority of removal from the incident and of examination when reaching hospital. This is used mainly, but not exclusively, for wounds of the chest and abdomen, for internal haemorrhage, and for all unconscious casualties.

T A tourniquet has been applied. The time for application of the tourniquet and subsequent releases should also be indicated on the label.

H Severe haemorrhage has occurred.

M Morphine has been given. The time of administration and dose should be written on the label.

C Contaminated or suspected of having been contaminated by persistent gas.

P Burnt by phosphorus.

Collection of bodies

4. When dead bodies are recovered they should be deposited in the nearest convenient building and some suitable covering placed over them, pending removal; they should not be left on the highway or in an open space. The public and all persons not directly concerned should be kept away whilst bodies are being recovered.

PART III

CHAPTER XVI

ELEMENTS OF HOME NURSING

1. To make room in the hospital for the seriously injured in the Air Raids, certain sick and wounded who do not or no more require constant attention in the hospital may have to be nursed in the homes. It is essential, therefore, that as many men and women as possible should have an elementary knowledge of the needs of sick persons, and of how to make them as comfortable as possible. It should be remembered, however, that in the event of war, many of the things which we take for granted in peace time in our homes, such as water, flush system, blankets and bed linen, variety of foods, etc., may be lacking or be in short supply; doctors would be extremely busy. The people best able to render effective services under these circumstances would be those who had prepared themselves in advance, and so could be expected to improvise and make the most effective use of available facilities. The necessity for this must always be kept in mind, and where conditions do not

permit of methods being carried out as described these methods must be modified or altered so as to give the patient the best possible care in the existing circumstances.

2. In looking after a sick person, the nurse must realise that her patient depends upon her, not only for the actual nursing needed, but also for re-assurance and help to get better. The doctor's instructions must be obeyed carefully, and it is very important for the nurse to develop her power of observation, so that she can give the doctor an accurate account of the patient's condition and obtain suitable instructions.

3. The choice of a sick room may be limited but, if possible, the room should be quiet and conveniently situated for the bathroom and lavatory. In cold weather, draughts should be avoided. The sick room should contain only the necessary furniture and furnishings, and must be kept clean and bright, because a sick person is influenced very readily by his surroundings.

The bed

4. The bed should be as comfortable as possible and of a convenient height. The low type of bed is not suitable for nursing purposes as bending puts a lot of strain on the nurse, and it is difficult to carry out treamtents satisfactorily. All the same it is frequently found in our homes, and indeed patients might have to be nursed on

mattresses on the floor. A lone charpoy can be raised on blocks or bricks.

5. The number of pillows which the patient may have varies. In some illnesses, the patient must be kept lying as flat as possible; in others, he must be well propped up. This can be achieved either by having as many pillows as necessary, if these are available, or by using a bed-rest on which the pillows are supported. This can be improvised by placing a chair upside down on the mattress at the head of the bed so that the pillows rest on the sloping back of the chair.

6. The bed clothes must be light and sufficient to keep warm and they should be put on the bed in such a way that the patient can tuck them round his shoulders. They must never be tucked so tightly that the patient cannot move his feet. The blankets should be covered with a washable counterpane.

7. The bottom sheet must be tucked firmly and smoothly over the mattress, at the top, feet and sides, so that it does not wrinkle. If the patient is confined to bed, a small mackintosh sheet and draw sheet, placed crosswise over the under-sheet and tucked securely under the mattress will help to protect the under-sheet, and keep the patient comfortable. The top sheet should be folded down over the blankets at the top of the bed, and may either be tucked in at the bottom, or folded back over the patient's feet.

Bedmaking

8. It is a great advantage if the patient can get out of bed once a day and sit in a chair while the bed is re-made, but this may not be possible, and it may even be necessary to change the bottom sheet with the patient in bed. To do so the patient may be rolled from side to side, or if two people are available, he may be lifted gently down to the bottom of the bed while the top part is made. It is always less tiring and better for a very ill patient if two persons can assist with bedmaking.

The patient's toilet

9. By this is meant washing the patient, attending to the boney prominences and skin folds to prevent sores, attending to the mouth and teeth, and to the hair, and generally making the patient comfortable. This should be done daily.

10. The patient may be well enough to wash his own face and hands, clean his teeth and brush his hair, but he may require to be helped. Everything should be placed on a small table well within his reach—a basin of warm water, two washing cloths, soap, nailbrush, talcum powder, tooth brush and paste, brush and comb, towels and clean pyjamas or equivalents.

11. When the patient has to be washed in bed, he is given a "blanket bath." To do this, everything that is required as above is collected and

L2CHEB/62—5

brought to the bedside, together with a jug or kettle of hot water and a bucket, and if required, methylated or surgical spirit for treatment of the areas likely to become reddened and sore. The window is closed, the bed clothes removed and folded over a chair, and the patient left covered with a thin blanket and with a freshly filled and covered hot water bottle at his feet (in cold weather). A second thin blanket or large bath towel should be rolled under the patient to keep the bottom sheet dry. The washing is carried out as expeditiously as possible, and without exposing the patient unnecessarily—first the face, then arms, front of body, legs and back, each part being thoroughly dried in turn. The water should be kept hot by replacing it by fresh water from the jug or kettle as required.

12. Where two surfaces of the skin come together, as in the groins, in the armpits, under the breasts, special attention must be paid to prevent soreness due to excessive perspiration and rubbing. These areas must be very carefully dried. then lightly dusted with talcum powder.

13. Bed sores develop very quickly over areas of the body where the bones come near the surface. These areas are known as pressure points. Sores must be carefully guarded against by altering the position of the patient as often as the parts are attended to, which should be 4-hourly in th case of severe illness. The skin over the

boney part is washed then well massaged with the soapy palm of the hand, thoroughly dried and dusted with talcum powder, which helps to absorb moisture. Sometimes the part is massaged with methylated spirit before the powder is applied, but care must be taken that the skin does not become too dry, or it may crack. It is also most important to see that there are no wrinkles in the sheets, or nightdress. Once a bedsore has formed, it is extremely difficult to get it to heal, as the circulation in these parts is poor, and it may become infected, particularly if the patient is paralysed or is suffering from diarrhoea and incontinence. Any treatment other than the simple routine one described above will be ordered by the doctor, but this is clearly a case in which prevention is better than cure, and the home nurse has a definite responsibility in this respect.

14. Following the washing of the patient, the mouth and teeth must be attended to. If the patient can use a toothbrush himself, he should be encouraged to do so, and to rinse his mouth with a mouth wash. Warm water containing about ¼ teaspoonful of bicarbonate of soda to a small tumblerful is a simple mouth wash, and helps to remove the dry sticky feeling of a dirty mouth. Sometimes it is necessary to gently swab out the space between the lips and the teeth and gums. Great care should be taken to prevent

damage to the gums and lips but, in severe illness, the cleaning of the mouth is one of the things which gives the patient the greatest comfort. Dentures must of course be thoroughly brushed and cleaned each time the mouth is attended to.

15. The patient's hair is then brushed and combed, the night clothes put on, the bed re-made, with clean linen, if necessary, the window re-opened, and the room left tidy.

16. Hot water bottles must be well covered, and should be placed over a blanket and *never* in direct touch with the patient's skin. This is most important if a patient is paralysed, or unable to move for any reason. Extensive burns can easily be caused by carelessness in the placing of hot water bottles.

17. A very ill patient, or one who has pain in, or injury to, legs or feet will be much more comfortable if the weight of the bed clothes is taken by a bed cradle. A light blanket directly next to the patient is a comfort when using a bed cradle, and the bed clothes should be so arranged that draughts are excluded. Sometimes also it is a comfort to the patient to have a pillow against which to prop his feet, and prevent his slipping down in bed, but there should be nothing such as fixed knee pillows or tight blankets to prevent free movement. An air-ring can be

useful, and it is now possible to borrow from the local authority such equipment as this which is helpful in nursing sick persons in the home.

Temperature

18. One of the first things the doctor will want to know about the patient will be the temperature. Normally this is 98.4°F, but it may vary slightly above and below this even in health. It is measured by a clinical thermometer, and every household should have one, and everyone should know how to use it, as it is a valuable indication of the patient's condition. When the temperature rises, the patient is feverish which shows that the normal body mechanisms are upset. This may be due to an infection, such as the common infectious diseases of children caused by certain organisms gaining entrance to the body, or there may be other less easily understood causes.

19. The clinical thermometer consists of a small glass rod within which is a narrow tube, and a bulb at one end. The bulb is filled with mercury which expands when heated and rises up in the narrow tube. It is prevented from returning to the bulb by a kink in the tube just above the bulb. On the glass rod is a scale of figures which shows how high the mercury has risen, and by reading this the patient's temperature is ascertained. The normal temperature point 98.4°F is clearly marked on the scale and the degree of

L2CHEB/62—6

feverishness from which the patient is suffering is indicated by the height to which the mercury rises. An accurate record of the temperature, taken four-hourly or as the doctor requires, must be kept.

20. The thermometer must be carefully wiped with a piece of cotton wool soaked in some weak disinfectant and washed carefully with soap and water before it is returned to its case, and again it must be wiped before being given to the patient. If in regular use, it should be kept handy standing in a jar of weak disinfectant, but it should never be given to the patient or replaced in the disinfectant without being wiped.

21. Care must be taken also to see that the mercury is completely shaken down into the bulb before taking the temperature. This is done by shaking with a sharp flick of the wrist. Both this and the reading of the height of the mercury can be mastered with a little practice.

22. The temperature is generally taken in the mouth, the thermometer being placed under the patient's tongue and held in position by the lips. Sometimes it is not possible to take the temperature in the mouth and this can then be taken in the axilla, care being taken first to see that the axilla is wiped dry.

23. It is usual to have the thermometer in place for at least two minutes so that it may register

accurately. While it is in position, the patient's pulse may be counted by placing the fingers of the right hand lightly over the patient's wrist where the artery running down towards the thumb may be felt. With a little practice, and with a watch in the second hand, the pulse beats can be counted. At this time also the rate of breathing can be counted and both of these may alter in illness. From these, the doctor can get very valuable information regarding his patient's condition, and for this reason, he practically always makes these observations for himself.

The patient's diet

24. Sick people are often extremely difficult over food, and the doctor should be asked for advice as to what the patient may have. It will then be the duty of the person looking after the patient to see that the doctor's instructions are followed, but this is not always so easy as it sounds, and much tact and persuasion may be needed to get the patient to take food.

25. The diet ordered for a person confined to bed is generally a "light" diet, and consists of easily digested food such as chicken, fish, eggs, jellies, khichri, dal and vegetable soups, sago and milk puddings, thin bread and butter, etc. In certain circumstances, however, only fluids may be given, but permission is generally given for these to be flavoured. Fluids may be fruit juices, milk flavoured in various ways or thin

clear soups. Unless the doctor gives instructions to the contrary, patient should be encouraged to drink as much as possible between meals, as this helps the skin and kidneys to act freely and so get rid of poisons from the body. There are certain illnesses, however, in which the amount of fluid which the body can deal with is very limited. In these cases the doctor will give precise instructions as to the amount which the patient may drink. It may even be necessary to measure and record accurately all the fluids taken by the patient in 24 hours, and the amount of urine passed by the patient in the same period, as the doctor may need this information to guide him in certain forms of treatment. Food should be served punctually, and as attractively as possible.

Medicines

26. It is important that medicines should be given precisely according to the orders written by the doctor on the prescription and copied on to the labels of the bottles by the chemist. These instructions must always be carefully read. If the medicine is a liquid one, and to be given by mouth, the exact dose should be poured out into a measured medicine glass, held level with the eye, or into a teaspoon or tablespoon as ordered. A small quantity of water is generally added. The bottle should first be shaken, and the dose poured out holding the labelled side of the bottle

uppermost to prevent soiling of the label, which would prevent the instructions being read.

27. Pills may be ordered, and some patients have great difficulty in swallowing these, so that the patient should not be hurried and should be given a drink of water, or, if he finds it better, a small piece of bread, to swallow along with the pills.

28. Drugs are frequently given by injection, for which the doctor will bring a syringe and needles. He may want these to be boiled before or after use, but more often now the syringe is carried in spirit in a special container. If you have to boil the syringe, and needles, take the syringe apart, rinse the parts carefully under running water, then wrap the glass barrel in a piece of old linen. Put all the part together in a small saucepan, cover with cold water, and bring slowly to the boil. Allow them to boil for five minutes.

29. The effect of medicines or drugs on the patient should be carefully observed, so that the doctor may know what effect they are having.

30. All bottles of lotions and medicines for local use, disinfectant etc. should be appropriately labelled and kept well away from medicines for internal use.

Dressing a wound

31. A wound is caused when the skin is broken. It may be a perfectly clean one, such as the cut made under conditions of surgical clealiness by a surgeon at operation, or it may result from injury, and therefore be infected by germs which produce a discharge called pus and thus be septic from the start. If a wound is discharging, it must be dressed as often as necessary. In doing this one must be careful not to introduce more infection, so the dressing must be carried out as far as possible under "aseptic conditions." To secure this, everything used, including the attendant's hands, must be rendered as clean and free from germs as possible. In the home, this is not always easy, but the important things to remember are these:

(i) The hands and forearms should be thoroughly washed and dried.

(ii) The soiled dressings should be removed with a pair of forceps (tweezers will do) preferably by a helper. These forceps are not used again during the dressing.

(iii) The area around the wound, and the wound itself if necessary, is cleaned with sterile cotton wool, moistened in warm boiled water, or in a solution of disinfectant made up according to the

directions, held and squeezed as dry as possible by forceps.

(iv) The fresh dressing, sterilised if possible, is picked up with forceps, and placed over the wound.

(v) The bandage is then applied.

The important things to remember are that the wound is never touched with the fingers; that the bowls and instrument used must be sterilised by boiling for at least 5 minutes; that dirty dressings must be burnt or otherwise disposed of immediately; that dressings already sterilised, ready for use, should be procured if possible, or under emergency conditions lint, old linen, gauze or any clean piece of cloth prepared by holding it in front of open fire till well browned with heat should be used.

32. It is particularly important to prevent infection in burn injury.

33. The aim of the sick attendant in the home should be to make and keep the patient as comfortable as possible; to see that the doctor's orders with regard to treatment, medicines, diet, etc. are carried out punctually at the required time and in the proper manner; to watch the patient's condition carefully, and so be able to give the doctor an accurate report of what happens in his absence.

PART IV

CHAPTER XVII

ELEMENTS OF HYGIENE

Communicable Diseases

1. In this part of the book we will deal with some elementary, yet very essential, precautions for maintaining health. One of the ways is to guard against communicable diseases. Communicable diseases are infectious diseases which can spread from one individual to another. These can be prevented. Some of them can be provided against by vaccination or inoculation, thereby increasing the resistance of the individual to fight the disease. The resistance so acquired is called immunity.

2. The disease or more correctly the germs of disease, as the disease here is a process of getting infected with the harmful germs, enter our body in several ways. One of the most important ways is to gain entrance through the mouth or nose. Here two of our body systems lie exposed:—

   (a) The breathing system—of nose, throat and the lungs, and

(b) The feeding and ingesting system of mouth, stomach and the bowels.

3. The entrance into the breathing system could be in one of the following ways :

(a) By small drops of mucus released in the air by a diseased person's coughing, sneezing or talking loudly. The projection in the air and in space will depend upon how unguardedly and how violently the patient performs these acts. The infective germs are contained in these drops. In a room with closed atmosphere and where proper facilities for ventilation are lacking, the concentration of these drops could be very high. The drops themselves are too fine to be seen by the naked eye. The atmosphere can become further charged, if the patient is allowed to spit indiscriminately. This method of spread of disease is referred to as "Droplet Infection".

Some of the most common diseases, common cold, flu, pneumonias, measles, chickenpox and more serious ones, smallpox, diphtheria, whooping cough, meningitis and tuberculosis spread in this way. One point needing particular attention is that most of these diseases are most virulent, from the point of spread, from the very beginning. In fact, the early stage, when the disease is developing, is the most ripe time for the spread of infection to others and that is when most of the damage is done. Preventive measures

must start early. Tentative segregation of the sick should start the moment something untoward is suspected. Protection of others must follow as soon as the disease process is sufficiently confirmed. The doctor must be consulted early in one's own interest and also of others; the first lot amongst those likely to get the disease would be his relations and friends.

(b) Germs like those of tuberculosis can survive a long time away from the sick host and can keep on floating about on dried bits of mucus or on particles of dust.

(c) Diseases like measles, chickenpox and smallpox which lead to peeling of skin or shedding of scabs can later spread also by small bits of these scabs containing germs floating in the air.

4. Another very important method of acquiring and spread of disease is, as we said above, through the feeding or ingesting system. An article of food or drink can get contaminated by contact with a person suffering from the disease or one harbouring the disease as a carrier. Food handlers who have, of late, suffered from cholera, typhoid, dysentery, diarrhoea or have septic sores on hands or harbour worms are veritable sources of contamination. A carrier can be out of these. In some cases, although a man has not shown manifest signs of the disease, the

infective germs thrive in his system all the same and are a potent source for spread.

5. The ultimate source of all such contamination is the excreta of the human being harbouring the disease germs. Such a person if not attentive to personal hygiene and toilet of hands will pass on the germs to others if employed to handle food.

6. All excreta and also rubbish heaps are places where the flies breed. They feed on excreta and collect good bits of it on their hairy legs. They also pass the germs through their own faeces. They thus leave a trail of contamination as they move from food to food and often they deposit the infected material directly on the lips of the baby or his exposed milk bottle.

7. The water supply also gets contaminated from the same source. Leaking sewage often find its way into water mains. Cesspools and pit latrines often seep through katcha wells.

8. Water going into fields can get polluted by open drains, indiscriminate defaecation or dumping of raw excreta, without proper composting. The low growing leafly vegetables such as coriander, salads and mint, and root vegetables, such as radish and carrots which are often eaten raw and fruits which are washed with water from way side nallas can be sources of infection.

A. CONTROL OF THE INFECTED SICK AND HIS ENVIRONMENTS

9. *Isolation*

First thing that needs to be controlled is the infected patient himself. His immediate contacts are also important. The degree of control will vary according to the nature of infection. A common cold and smallpox will need different degrees of isolation. Isolation of the sick to be effective must be done from the earliest stages. Where needed, his immediate contacts should also be kept apart and examined by the doctor every day for appearance of any signs of disease. With the patient his feeding utensils and other things of personal use have also to be kept apart.

10. *Notification*

In case of diseases like smallpox, diphtheria, meningitis, cholera, plague, etc., the health authorities have to be notified. This is to enable them, so to say, to throw a net of preventive measures all round the source of infection and prevent spread which otherwise will have serious consequences.

11. *Nursing of the sick*

Patient should be nursed in a room which is well ventilated, *i.e.*, the inside air is not stagnant and is moving without producing a cold

draft. Sunlight when not too hot should be freely admitted. It is one of the best killers of harmful germs like tuberculosis. Expose the patient's linen and blankets and even put out the bed when possible. Dust is not to be stirred. Therefore, when sweeping the room do it with a wet mop to which a little disinfectant like cresol or white fluid has been added. Provide a proper spittoon which also should contain a little disinfectant. The patient must not spit outside. All discharges from the patient, *i.e.*, stools, urine, sputum, mouth and body washing should all be mixed with cresol solution and kept for about ½ hour before disposal. In tuberculosis the disposal of sputum requires particular care. It should be further burnt out in some pot. In typhoid fever, dysentery and cholera, stools have to be properly disinfected by adding cresol. Particular attention has also to be paid to patient's toilet when skin is to peel or scabs of chickenpox or smallpox have to come off.

12. *Personal Hygiene of the Attendants*

The sick attendant should wear a nursing gown. A good apron will do where danger of getting infected material on one's person is less. A face mask over nose and mouth should be worn where there is danger of air-borne infection. The attendant should scrupulously clean his hands after handling all infected material and again when relieved of his duty.

13. We build up resistance or immunity against some diseases by chance taking in of infected material present in dust and surroundings during our growth from infancy to adulthood. Chance taking in of small doses helps. A massive dose may end fatally. We become immune to certain diseases like measles, chickenpox and mumps by undergoing the actual illness. Scientists have produced vaccines by treating and weakening the germs or their poisons so that we get only a mild or practically no adverse reaction and at the same time become immune by injection of the vaccines. We must take advantage of these benefits. These are :—

(a) *Vaccination against Smallpox*

This gives complete protection. Get a child done early, usually between 3-6 months of age, even earlier if there is danger of smallpox in the neighbourhood. Revaccination is needed at the age of 5 and then every 5 years till he is 20 years old and also whenever there is a danger of outbreak of the disease.

(b) *Whooping Cough, Diphtheria and Tetanus*

All the three are mentioned together, as there is a protecting vaccine called Triple Antigen which combines effects against all the three. The vaccine or rather the mixed vaccine can be given

with little untoward effect during infancy—3 injections are required to be given, the second and third at 4-6 weeks' interval. In the case of tetanus, a booster dose would also be necessary every time an injury is acquired in the streets or in the fields, *i.e.*, in surroundings where animal litter or manure from it, is likely to be present, even in small quantities.

(c) *Tuberculosis*

Another vaccine which has now proved its worth is the B.C.G. vaccine against tuberculosis. All susceptible children and adults, particularly the nursing staff and those required to attend on tuberculosis patients should be immunised with this vaccine.

(d) *Typhoid group of fevers*

The T.A.B. is another mixed vaccine which gives complete cover against typhoid group of diseases. Two doses are given at 10 days' interval and a maintenance dose is required every year.

(e) *Cholera*

Cholera vaccine is a very important source of controlling cholera epidemics. The effect, however, wears off after 6 months. So its use is reserved when protection for short periods is required.

14. *Food Handler*

In the preceding paragraphs we have seen how the food gets contaminated. It is obviously not safe to employ a man as a cook who has had typhoid, cholera, dysentery or any severe diarrhoea recently. It is safer to get him tested against being a carrier by examination of his stools in a hospital on 3 different occasions. It is also essential to inculcate in him a habit of thoroughly scrubbing the hands with soap and water and nail brush when starting work and he should be provided with clean set of clothing including a cap and apron.

15. *The cook house and cooking utensils*

Cleanliness of these greatly contributes to health of the family. Utensils should be thoroughly cleaned and scrubbed not with sand and mud from the wayside but with clean ashes or soap and water or Vim powder if available. It will be very desirable to have a flyproof kitchen but at least all food and milk should be properly covered.

16. *Food*

All cooked food is safe for eating if fresh and wholesome. The articles eaten raw particularly ingredients of a green chutney like coriander and mint leaves, green chillies, radishes,

carrots and fruit should be cleaned with many changes of water. As an additional precaution they could be kept dipped for ½ hour in water to which stabilized bleaching powder has been added (1 teaspoonful to a gallon of water). It is safer not to buy split or cut fruit in bazaars. It is dangerous to buy sweets and sherbats (syruppy drinks) from hawkers and pedlars who are obviously not clean. Milk from whatever source should be boiled before use.

17. *Ice, aerated waters and sweet drinks*

These should be taken with caution unless from a factory which is duly inspected by health authorities. Germs producing typhoid and cholera can survive in ice and aerated waters. It is safer to use ice to chill drinks rather than add it to drinks.

D. Control of Flies, Garbage, Animal Litter and Human Excreta

18. *Flies*

Having controlled the infected patient and his environments, instituted personal protective measures, including immunisation of susceptible individuals and having taken measures to make our food safe, we should look to flies which besides causing nuisance spread diseases such as cholera, typhoid, dysentery, diarrhoea. "Swat the fly" is all right but then it breeds very rapidly and

in millions. The key to the solution is to stop its breeding. If there is no exposed garbage, animal litter or excreta there will be no flies, because the fly lays its eggs and its young ones called larvae hatch in these materials.

19. *Garbage, Animal Litter and Human Excreta*

Take following measures for disposal :—

(a) Burn as much of the rubbish yourself in your kitchen as possible.

(b) Do not just throw it on your neighbour's door, but put it in municipal bins, sheds or places provided so that it can be removed from there in one heap or lot.

(c) In the absence of a proper latrine dig a shallow trench for temporary use and cover well the excreta at least 6 inches with earth. When required for a longer period get a deep trench or a bore hole latrine made. For details *see* Appendix A and B.

(d) Remember excreta properly burried or composted could meet quite a large part of our manure requirement.

(e) During war conditions when municipal sewage and cartage system fails, excreta can be safely dumped in large closed pits made in the shape of a deep trench

8-12 feet deep and completely closed except for an opening with a fly proof lid. This is called Ottoways pit. For details *see* Appendix C.

(f) Another source of fly breeding—a very important one in our country—is animal litter. It is also a great source of manure. If dumps have to be made pack them tight and ram on a layer of 6–8 inches of mud or clay. This sort of tight packing leads to generation of heat which kills larvae of flies.

(g) If you must keep a cow or a buffalo collect her litter and make manure as described above. It will pay you and help your friends and the country. Making of cow dung cakes is uneconomical besides being insanitary. You may also learn how to make gas from the dung.

20. *Control of Drinking Water*

We have in towns learnt to depend upon municipal piped water supply. This supply cannot be taken for granted under war conditions. We may have to look for wells or put hand pumps in the garden or lands available. We have earlier drawn attention to the fact that this water cannot be taken as safe for drinking.

21. *Care of a well*

If the well is already in use, we proceed to purify its contents. If not in use, its walls and parapet should be repaired. Silt, dirt and stones at the bottom may have to be removed. It would be desirable to cover the well and put a pump on it. Also take following precautions to prevent contamination of water :—

(a) Ensure that there is no pit latrine or cesspool or collection of stagnant water within 50-100 feet of the well.

(b) All water spillings near the well should be drawn away by pucca drains and not allowed to seep through. Washing and ablution should be allowed not less than 50 feet from the well unless there is an arrangement with cemented flooring.

(c) In the absence of a pump, there should be only one common bucket to draw water. Private pots and pans should not be allowed to draw water.

22. *Purifying or making water safe for drinking*

Clean looking water is not necessarily safe. Mere passing of water through a thick cloth does not keep back the harmful germs in water. All water from surface, streams and shallow wells

and handpumps should be treated as suspect till purified.

23. *Purification of water in the well*

This is best done with bleaching powder. Amount of bleaching powder required to purify 100 gallons of water is first determined by a test called the Horrock's Water Test. It is a simple test and can be easily learnt and performed once the Horrock's box containing the equipment is available. This test is done once or twice a week depending upon the basic purity of the water. The total quantity of the water in the well is next calculated by noting its girth or circumference and the depth of the water in the well. The quantity of bleaching powder required to purify the whole of the water in the well is now measured and made into a paste in a bucket to which more water is later added to make a uniform solution. This is added to the well and the water in the well well-shaken to mix it.

24. The bleaching powder acts by virtue of liberating chlorine which kills all the harmful germs or bacteria. The standard attained by the test is such that a trace of free chlorine is always left after the bacteria have been killed. This can be tested by adding a few drops of a starch and cadmium iodide solution to the treated water after half an hour when a faint blue colour will result. It takes half an hour to kill the bacteria

after the bleaching powder solution is added. Water on no account, therefore, should be used before that time.

25. *Purification of water from hand pumps*

Water from hand pumps will have to be collected in containers. It is not always possible to have containers of the size of 100 gallons. The dose of bleaching powder determined for 100 gallons by the Horrock's Test will, therefore, require to be divided according to number of gallons a vessel contains. That is done the following way :

(a) Take a glass tumbler about 12 oz. in size.

(b) Put in it the bleaching powder for 100 gallons. Make it into a paste and then solution as stated above. Fill the glass with water to contain about 12 oz.

(c) One teaspoonful of this solution is sufficient to purify 1 gallon of water.

(d) Common containers like a bucket or garrah (chatty) takes about 3 gallons and an empty ghee or kerosene oil tin 4 gallons of water.

26. *Purification of water from a river or tank*

This water may be muddy. It should first be clarified before chlorination. To clarify add

1 to 3 grains of alum powder to a gallon of water depending upon the suspension of organic matter in the water. The suspended matter will settle down after a time on addition of alum. The clear water from the top should then be siphoned off by a rubber pipe into another container and purified as per para 25 above.

27. *Purification of water for household use*

The easiest and most certain way is to boil water. When thirsty and not sure of the quality of water always ask for a hot cup of tea with milk also boiled.

28. *For Emergency carrying*

One can get made the following solution by a chemist and carry it on a journey :—

Iodine	1 part	Two drops would purify a glass of water but do not use it regularly.
Potassium Iodide	1 part	
Water	50 parts	

29. *Conclusions*

In this Chapter we have dealt with prevention of communicable diseases as a means of maintaining health. We have seen how they spread and what precautions we can take to prevent them.

(a) The sick patient and his environments must be controlled early to restrict the spread.

(b) Simultaneously measures should be taken to protect the people who are exposed to

the danger. Personal protective measures backed up by special measures such as vaccination of the contacts of smallpox and mass inoculation against cholera of the people exposed, can quickly control the spread of these diseases.

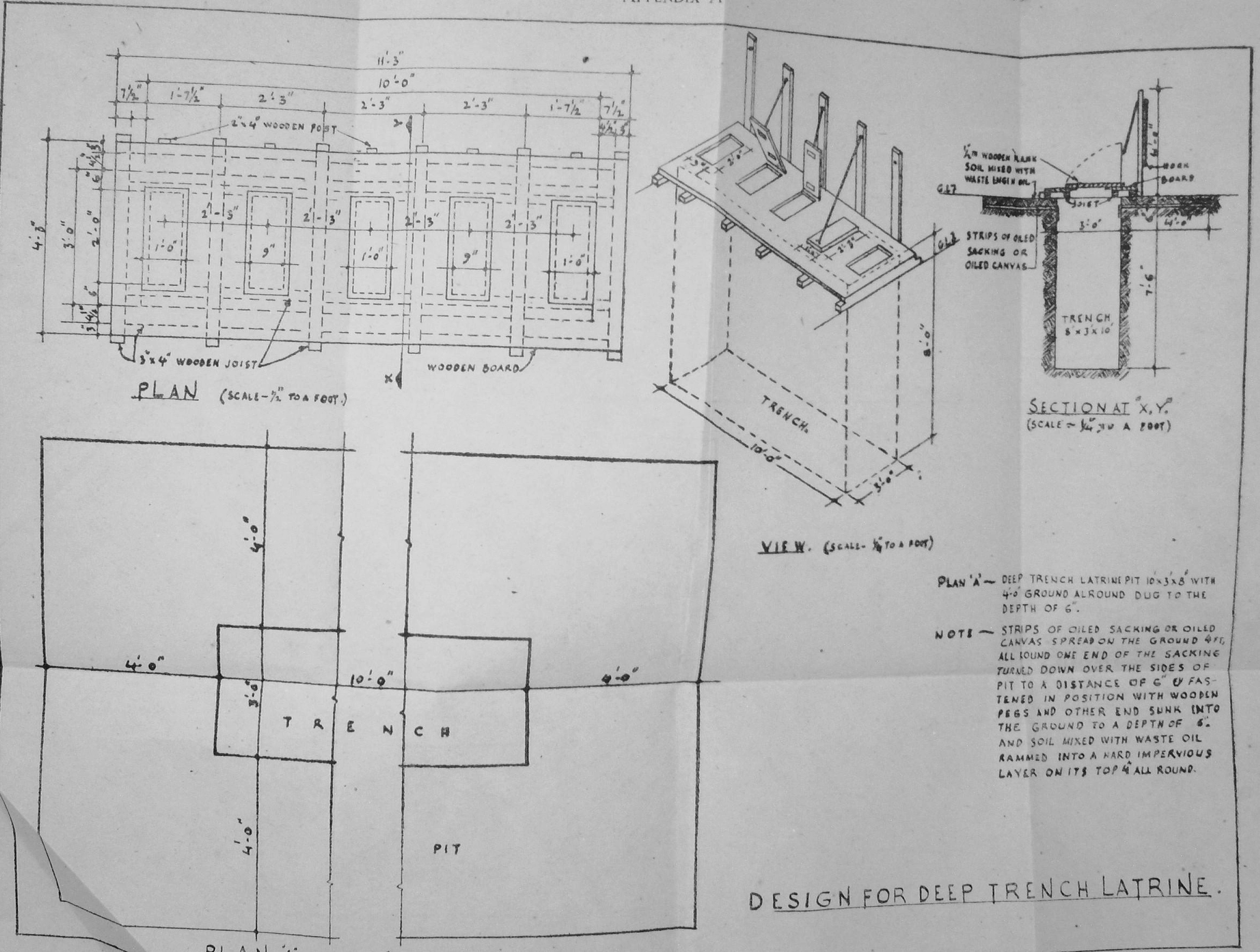
(c) Immunising started from early childhood can do much to eradicate those diseases where active immunisation is effective. Vaccination against smallpox, B.C.G. vaccination and inoculation against whooping cough, diphtheria, tetanus and typhoid fevers are examples in view.

(d) Articles of food and drink must be protected from getting contaminated by dust, flies and infected food handlers.

(e) We must ensure that the waste products, *e.g.*, garbage, animal litter and human excreta are stored and disposed of correctly so that flies do not breed and the excreta is not allowed to pollute food and water.

(f) Lastly we must ensure that we have a safe water supply.

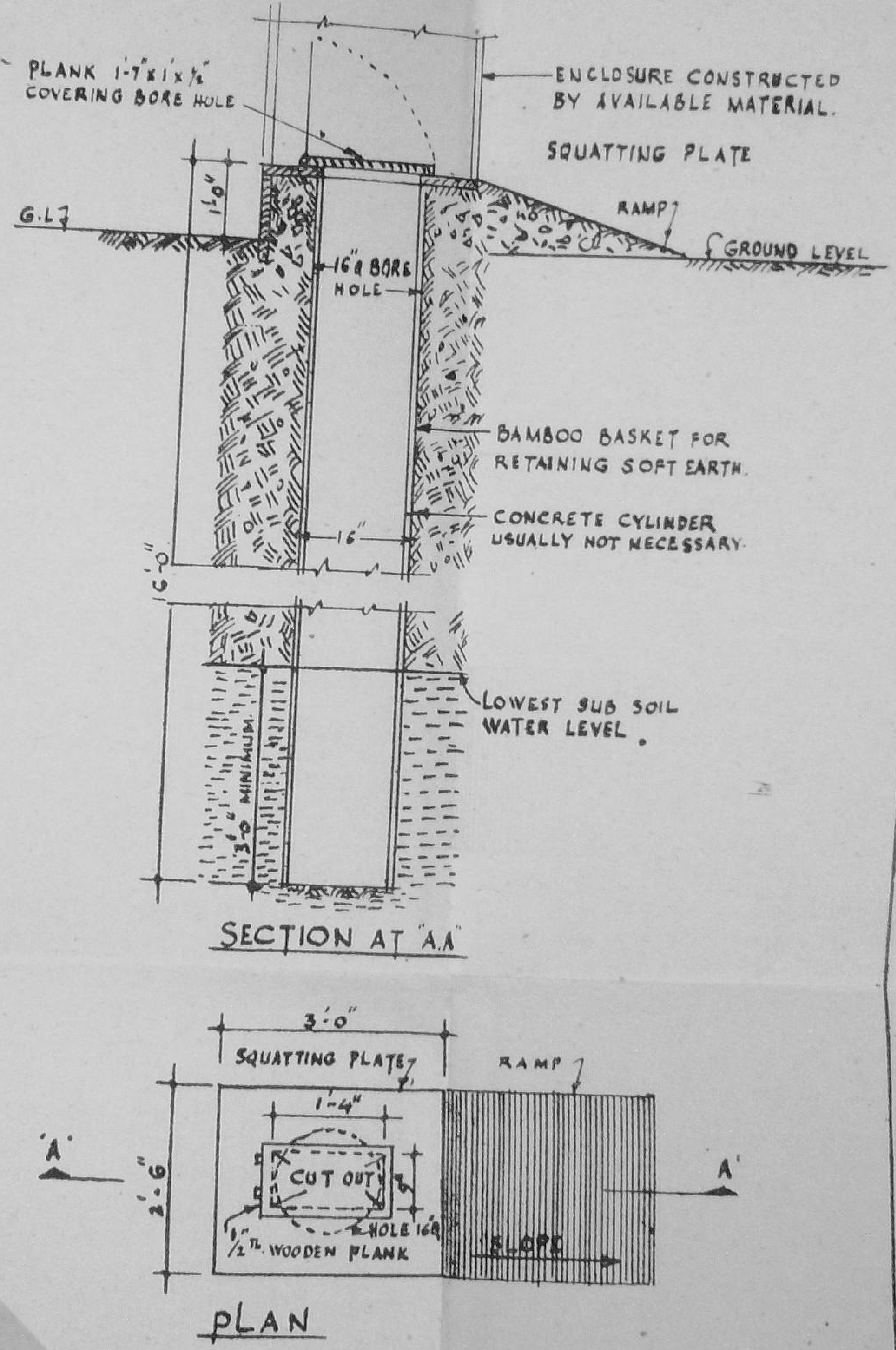
L2CHEB/62—20,000—15-4-64—GIPF.



PLAN 'A' — DEEP TRENCH LATRINE PIT 10'x3'x8' WITH 4'-0" GROUND ALROUND DUG TO THE DEPTH OF 6".

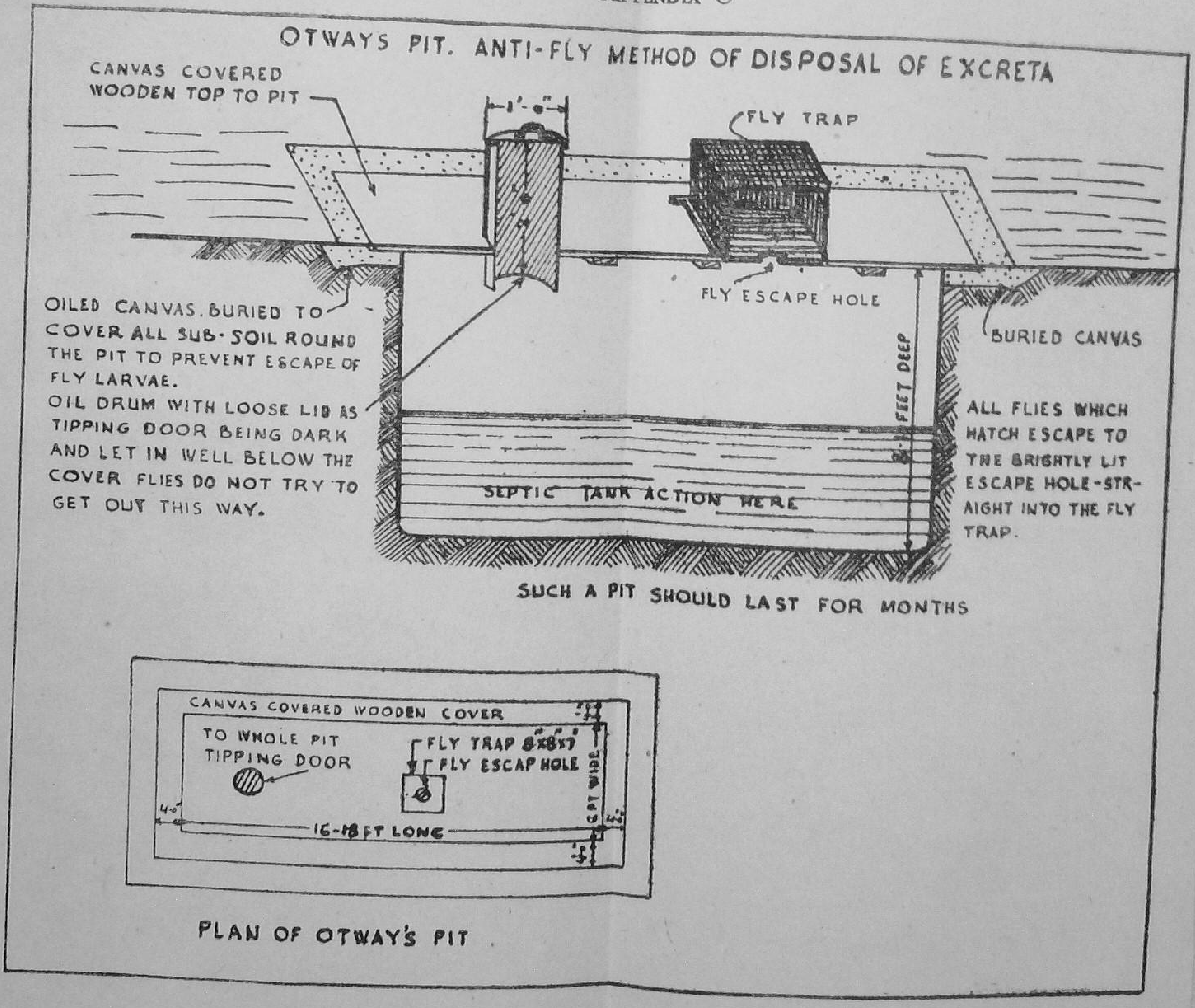
NOTE — STRIPS OF OILED SACKING OR OILED CANVAS SPREAD ON THE GROUND 4FT. ALL ROUND ONE END OF THE SACKING TURNED DOWN OVER THE SIDES OF PIT TO A DISTANCE OF 6" & FASTENED IN POSITION WITH WOODEN PEGS AND OTHER END SUNK INTO THE GROUND TO A DEPTH OF 6". AND SOIL MIXED WITH WASTE OIL RAMMED INTO A HARD IMPERVIOUS LAYER ON ITS TOP 4" ALL ROUND.

DESIGN FOR DEEP TRENCH LATRINE.



DESIGN FOR BORE HOLE LATRINE.

SCALE – ½" TO A FOOT


OTWAYS PIT. ANTI-FLY METHOD OF DISPOSAL OF EXCRETA
CANVAS COVERED WOODEN TOP TO PIT
1'-0"
FLY TRAP
FLY ESCAPE HOLE
OILED CANVAS. BURIED TO COVER ALL SUB-SOIL ROUND THE PIT TO PREVENT ESCAPE OF FLY LARVAE.
OIL DRUM WITH LOOSE LID AS TIPPING DOOR BEING DARK AND LET IN WELL BELOW THE COVER FLIES DO NOT TRY TO GET OUT THIS WAY.
BURIED CANVAS
FEET DEEP
ALL FLIES WHICH HATCH ESCAPE TO THE BRIGHTLY LIT ESCAPE HOLE-STRAIGHT INTO THE FLY TRAP.
SEPTIC TANK ACTION HERE
SUCH A PIT SHOULD LAST FOR MONTHS
CANVAS COVERED WOODEN COVER
TO WHOLE PIT
TIPPING DOOR
FLY TRAP 8"x8"x7"
FLY ESCAP HOLE
6 FT WIDE
4-0
16-18 FT LONG
PLAN OF OTWAY'S PIT

Issued by

Central Health Education Bureau
Kotla Road, New Delhi-1.

6